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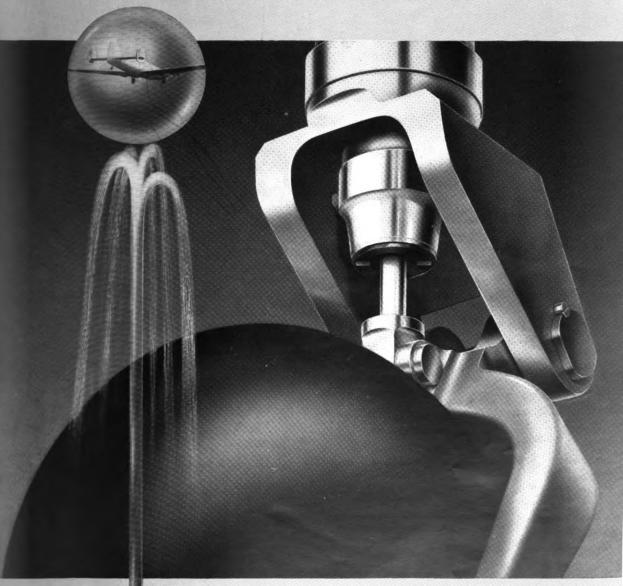
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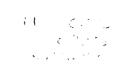
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THE ROYAL AIR FORCE QUARTERLY

Embodying also the Royal Australian Air Force, Royal Canadian Air Force, Royal New Zealand Air Force, and South African Air Force

EDITOR:

WING COMMANDER C. G. BURGE, O.B.E., q.s., R.A.F. (Retd.)

Assisted by an Advisory Committee of Members of the R.A.F. and Air Forces of the Dominions

VOLUME XVI

DECEMBER, 1944

NUMBER 1

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The Season's Greetings

To the Air Forces of the Commonwealth and Empire; the Allied Air Forces serving with the Royal Air Force; the Air Forces of the United States and the U.S.S.R. our sincere good wishes for

A SPEEDY VICTORY

AND
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Good Wishes for Christmas and the New Year to all

EDITORIAL

R.A.F. Benevolent Fund

In view of the increasing demands being made upon the resources of the Fund, the Council have found it necessary to appoint a Controller and have selected Air Vice-Marshal Sir Hazelton Nicholl, K.B.E., C.B., R.A.F. (retd.), for this appointment.

The amount donated by the R.A.F. QUARTERLY to the above Fund for the quarter ended 1st December is given below.

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War and International Situation

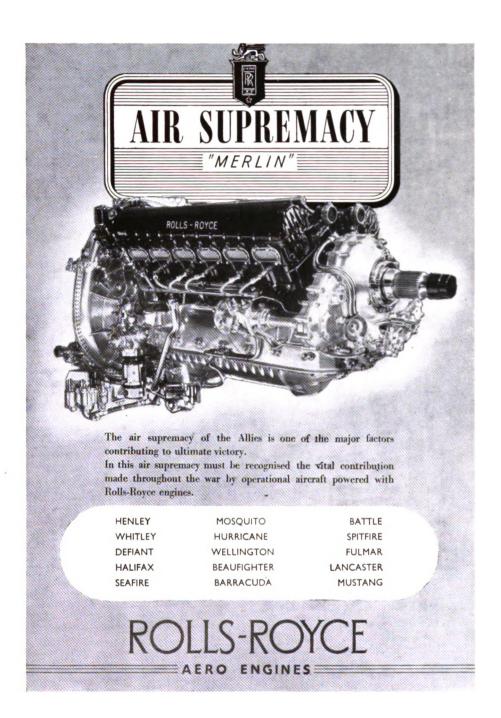
THE debate following the Prime Minister's statement in the House of Commons on 28th September, 1944, provided some outstanding contributions to the problem of how to win the peace. The following are the more important aspects dealt with by several speakers:—

Economic Restoration ("Freedom from Want")

Many speakers drew attention to the fundamental necessity for the economic restoration rather than the intimate political direction of Europe. Captain Alan Graham ended his speech on this note, saying that "it is not so

much political aim or political direction as rather economic restoration which is so necessary. It is poverty and hunger which breed revolution and dictatorships. Sound politics and true liberty can only come out of settled economic conditions." Mr. Pethwick-Lawrence argued that the first objective of our lead in Europe should be "to call attention to the essential unity" of this Continent. He did not believe that there could be any real, lasting prosperity, either in this country or in any part of Europe, unless there was prosperity through-out the whole. "Any degradation and misery in any one country in Europe," he said, "is bound to have its sinister influence upon all other countries." He believed that the time had come when it was not merely a spiritual truth but a material fact that no country could live to itself alone or exist or prosper to itself alone. He did not believe we could tolerate in the future, as we had been prepared to do in the past, vast pools of stagnant misery within any one country in Europe. With regard to Germany, the central figure in Europe, the first task was to prevent her from fomenting another war, and the second was to prevent her from becoming a plague spot of destitution and unemployment which would be bound to infect all the other countries of Europe, and ultimately the people of this country. "These two rocks are the Scylla and Charybdis between which we have to steer a very difficult passage."

With regard to this aspect of the problem it



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is of interest to record here the views of Mr. Richard Law, Minister of State, who led the British delegation to the Hot Springs Conference. Summing up the "Feeding the World" series of broadcast talks in the B.B.C.'s Pacific Service, he pointed out that food planning on an international scale is more than an interesting theory: it is a realistic measure directed towards a higher standard of living and an essential to world peace,

"... One of the first things we must do is to see that the out-of-date parrot-cry 'living space' is deleted from international language. ... There never was such an absurd slogan, so slender a pretext on which to plunge the world into war. . . . The whole world is the living space of each one of us. And we shall get our living space not by fighting but by working together. . . . The task we have set ourselvesthe achievement of freedom from want—is not just a dream. If we have the patience and the courage we can accomplish it. It is true that the difficulties in the way are many and formidable. The job calls for a scale of international cooperation never before attempted, but it can be done if the peoples, and not only their governments, bring to this problem a new and fresh attitude of mind, if they forget the terrors and the superstitions of the past."

The second point stressed by a number of speakers in the debate above referred to was

Unity of the Three Great Powers

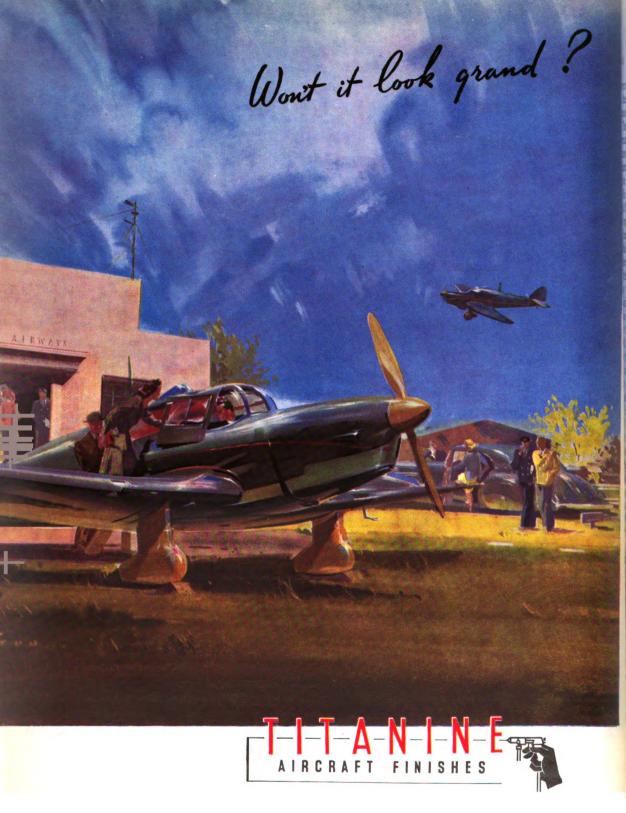
Sir Edward Grigg believed that all parts of the House were agreed that this was the key to success in winning the peace. "Everything in war," he said, "has been based on that, and there will be no peace in the world, in Europe or in any other part of the world unless the unity of those great Powers is maintained hereafter." Mr. Quintin Hogg drove this point home further when he said "If Russia and America quarrel there can be no possible bar to the reemergence of Japan in the Far East as a menace to them both. If Russia and Great Britain quarrel there can be no possible step which will prevent the re-emergence of Germany in Europe as a menace. . . . That is the rock upon which we must build our foreign policy."

Mr. Eden, in his reply to the debate, responded to the views of the House on this point. He said that "When the world emerges from its turmoil, it will yearn for lasting peace and the plain truth is that there can be no guarantee of any such peace unless we, the United States and the Soviet Union, can work

together in enduring harmony."

The House was deeply impressed by the speech and timely warnings made by Lord Dunglass. This speaker drew attention to two essential facts which in his opinion governed our relations with Russia, and he considered





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that unless we realized these facts success would elude us in the negotiations with that country over such questions, for example, as the future of Poland. The first of these factors was that "Russia operates under a code of ethics which is by no means the same as our own. For that I am not blaming the Russians." He then proceeded to give examples of their different interpretations. He continued: "Unless we face the fact that, at the present moment, this country and Russia operate under two different sets of standards, there will stretch before us a long vista of political difficulties, misunderstandings and disillusion."

The second factor was that "in our political negotiations with Russia we must not shirk plain speaking. To that and that alone will the Russians respond." He concluded by saying that in this country there is a great store of goodwill towards Russia, but he thought we served our friendship best by a plain warning now that in her attitude towards her smaller neighbours she was doing much to forfeit and sacrifice the goodwill which her heroism had won. "If these three great Powers-Great Britain, the U.S. and Russia—wish to offer themselves to humanity as the founder Powers of a wider world organization for peace; if, in addition to their undoubted ability to dispense power, they also seek to dispense justice, then there is an obligation upon each and upon all to agree, at least, upon a common interpretation of independence and freedom.

The Prime Minister (Mr. Churchill) in his statement to the House on his return from his recent conversations in Russia, dwelt upon the necessity for bending all our efforts ceaselessly on shattering the enemy's hope of driving a wedge between ourselves, the Americans and the Russians.

"You would not expect," he said, "three great Powers so differently circumstanced as Britain, the United States and Soviet Russia, not to have many different views about the treatment of the various and numerous countries into which their victorious arms have carried them. The marvel is that all has hitherto been kept so solid, sure and sound between us all. But this process does not arise of itself. It needs constant care and attention. Moreover, there are those problems of distance, occasion and personalities which I have so often mentioned to the House and which make it extremely difficult to bring the heads of the three principal Allies together in one place at one time. I have, therefore, not hesitated to travel from court to court like a wandering minstrel, always with the same songs to sing—or the same set of songs . . . no final result can be attained until the heads of all three Governments have met again together. . . . After all, the future of the world depends upon the union of the three most powerful Allies. If that fails, all fails; if that succeeds, a broad future for all nations may be assured."

(On 6th November, the twenty-seventh anniversary of the October Revolution, Marshal Stalin made his annual speech to the Moscow Soviet. After reviewing military developments the Marshal took up the theme of Allied solidarity: "There is talk of differences between the three Powers on certain security problems. Of course there are differences, and they will arise on a number of other issues too. Differences of opinion occur even among people in the same party. What is surprising is not the existence of disagreements, but the fact that they are so few and that as a rule in practically every case they are resolved in a spirit of unity and co-ordination among the three Great All the efforts of our enemies to divide the United Nations had failed because "the alliance between the U.S.S.R., Great Britain and the United States is founded not on accidental transitory considerations but on vitally important and long-term interests.")

The third point on which the House showed fundamental agreement was on the

DISARMAMENT OF GERMANY

Not only was it necessary for the three great Powers to be agreed on this; what was equally important and fundamental was that they should live up to it and that really effective provisions and safeguards were made for ensuring this and preventing any German rearmament. Replying to the debate, Mr. Eden expressed his conviction that "the principal danger to Europe after the defeat of Germany will be the re-emergence of a militant Germany." How this could best be avoided would be a continuing problem for the foreign policy, not only ourselves "but of all those who come after us."

From this we may logically turn to the results of the Dumbarton Oaks conversations on

WORLD PEACE AND SECURITY

The tentative proposals for the establishment of a world-wide organization, to be called the United Nations, for the maintenance of peace and security are published in full elsewhere in this Journal. These tentative proposals amount to what President Roosevelt has fittingly described as a "workable League of Nations." Speaking in the House of Lords on 11th October on the military provisions of this tentative

plan, Lord Cranborne said that they had been carefully worked out to ensure that an armed force could, if necessary, be brought to bear swiftly and effectively to maintain or restore peace. This, from bitter experience, was absolutely essential if aggression was to be halted.

The forces of international law and order should be so strong that aggressors would know that they were bound to be beaten if they embarked upon a policy of violence. Here the new air arm would be of immense importance. If the new organization were adopted it would make it possible to deal with vital social and economic questions even more effectively than the League was able to do. The social and economic provisions would be utterly valueless without a good security organization.

It was an essential element to restrain aggression in bringing about the prosperity of the world. Whatever might be done in the economic sphere he believed that the security sphere was the most important of all.

Unlike any organ of the League of Nations, the Security Council would have always at its disposal armed force. In order to make it possible for urgent military measures to be taken it is proposed that national air force contingents should be held immediately available by the members for combined international action. There would be a Military Staff Committee composed of the Chiefs of Staff of the permanent members of the Security Council. The use of naval and land forces is also allowed for.

We suggest that the organization, administration and location of these "National" forces, which are to be held immediately available for combined international action will provide ample opportunities and facilities for all members of these forces to receive a thorough "international" education. The aim of such education and military training should be to foster international fellowship and understanding by providing opportunities for the personnel of these different "nationalities" to serve together for a common purpose—that of preserving World Peace—to meet and discuss matters of interest—and pursue studies which will help towards a better international understanding. These "national" forces are a World Force which one hopes will be not only a Great World Force in the military sense but also a Great Force in promoting international goodwill and understanding.

The Belgian Foreign Minister, M. Spaak, speaking on Belgian foreign policy, recently stressed that the political union of Great Britain and Belgium ought to be founded on a military and economic union. It was perhaps too early,

he said, to discuss economic problems, but the military ones were ripe. The Belgian Army might be reconstituted on the British model. Belgian aviation, which for four years had been incorporated in the R.A.F., would always need bases in Great Britain, and the R.A.F. would also need bases in Belgium. A military cooperation, exchange of information and officers, and joint manœuvres would give a solid basis to political agreements.

This suggestion of M. Spaak is one that can be commended as a first step towards the higher and more complicated task of achieving unity of outlook, purpose and action on a

world basis.

This "regional" unification of States was discussed by many speakers in the recent debate already mentioned, and they referred to the need for our close collaboration with our neighbours in Western Europe and with the small powers generally, but particularly with Western Europe. Mr. Ivor Thomas made the point that "the United States has already taken the lead in good neighbourliness over the whole American continent; the Soviet Union clearly intends to give a lead in integrating the whole of Eastern Europe; China will certainly give a lead to the continent of Asia when the Japanese have been overthrown and when she has recovered her strength. It is for us, in Great Britain, to give a similar lead in bringing to an end the Balkanization of Western Europe; for in this world of super-States we can no longer regard such countries as Belgium, Portugal, Holland, or even ourselves in this island, as having the potentialities and capacities of a great Power. Western Europe . . . can be regarded to-day only as a congeries of small States, and it is for Great Britain to give the lead in bringing about some closer degree of integration in this wonderful part of our globe.'

Mr. Eden said that he agreed with everything that had been said on the subject of the need for our close collaboration with our neighbours in Western Europe and with the very small Powers generally, particularly with Western Europe. But he went on to qualify this by saying that "we should be wrong if we thought that in any such arrangement alone we should find peace or security for ourselves. It is an element in the general international system and . . . it will give us more authority with the other great Powers if we speak for the Commonwealth and for our neighbours in Western Europe. That seems to me the right conception of the structure that we should try to build, and that is just the task on which we

are now, in point of fact, engaged."



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Post-War World

By the courtesy of the British Legion we are privileged to publish elsewhere in this number of THE ROYAL AIR FORCE QUARTERLY the winning essay of their £500 prize competition for essays by men and women in the Forces on "My Ideas and Hopes for Post-War Conditions: How the British Legion can Help Me to Realize Them."

There were over a thousand entries representing all the Services. The competition aroused immense interest both at home and overseas. The results of the competition are summarized in the British Legion Journal of

November, 1944:—

"Men in the Burma jungle, in the Arctic snows, in the prison camps of Germany, men in the liberating armies of the Western Front and in Italy, sailors in the fo'castle of merchant ships in distant seas, cadets training in Canada, and women serving abroad in the Women's Auxiliary Services set down their thoughts in writing. The result is a symposium of ideas. unique and up-to-date, which will be of immense value to many besides the British Legion.

"A survey of the essays as a whole is revealing. Housing is bracketed with employment, wages and pensions at the top of the list. These are in every essay. Almost as much attention is devoted to education and health, with politics and economics in the third place down the list. These run practically level with ethical questions—an increased social consciousness and a revival of true Christianity.

"Other considerations appear in this order: International relationships; industry, trade and commerce; town and country planning; agri-

culture; public utilities.

"How they hate war!—and any prospect of new wars in days to come! This is the one thing any Government must ensure them against if

it is to gain their support.

"Social security may not always be clearly understood, but it is something they nearly all want-men and women. They want houses, not flats, and a garden. They are determined to have good schooling for their children, and more comfort and adaquate subsistence pensions in old age. No more slums. The badly fed child too often becomes the ill-nourished unskilled workman.

"One reads between the lines that anxiety is felt by many as to their qualifications for taking up civilian employment. They fear for themselves and their families. From brigadier downwards, all their dreams are focused on contentment in the home once they get back to it.

"None want alms. For a beginning, while wages are being stabilized they suggest a period

of training subsidized by the State.

"In education, vocational tuition for the young. and for adults further training, with special provision for ex-Service men and prisoners of war.

"Not only do they aspire to a University education, but some of the essayists would put the school-leaving age as high as eighteen.

"Prevention of disease is expected to play a large part in the post-war system, with State-controlled hospitals and medical services, free to all.

"There seems to be a widespread belief that the State can bring about efficiency in almost every sphere of life, but this feeling contrasts curiously with a distrust of politicians.

"There is a general disposition to treat the existing system of democratic representation with suspicion. It is significant, perhaps, that no one party is favoured or condemned; it is just a disbelief that men go in for a political career from purely disinterested motives. A closer study of economics by the masses and a better use of science for peaceful ends about sums up the remedies that many have in mind.

"A W.A.A.F. wants conscription of women to continue after the war. A spell of training in agriculture, or in day nurseries, canteens or communal restaurants would be a useful pre-

paration for marriage, she says.

"A soldier in the East pictures a game of cricket on the village green and hears again the church bell ringing—and asks for nothing better when he comes home.

"Others soar to heights of world citizenship, a world in which nationalism counts for little

and class distinctions for nothing.

"Many busy themselves with a world police force, and with international monetary and economic systems which they hope will avert the causes of war. Ideas on control vary. They don't seem to worry much about it. But cartels and monopolies must go, they think.

"The essayists, or most of them, are vague about town and country planning, but would

like more parks and open spaces.

"Fair play for farmers and farm workers is demanded, though nothing very specific is proposed. Emigration, for some reason, is not popular.

Home, food, clothing, children's allowances and an old-age pension sufficient to live on are the things which chiefly occupy their thoughts.

"We have left their views on the British Legion to the last. Some know the Legion well; others had not even heard of it.

"All of them have faith in an organized ex-Service movement and believe the British Legion, if strong enough, could promote their happiness and guard their interests as no one else could."

TO THE MEMORY OF

Group Captain P. C. Pickard D.S.O. AND TWO BARS, D.F.C.

TARGET AMIENS

Grey walls shadowed, grey yard starlit, Taut at the end of the white road's rope Men whom the dawn would etch in scarlet, Breathlessly waiting, not daring to hope.

Fighters' swift weaving, over and under, Smooth loads falling, like peas off a knife, Stone walls tearing, like paper, asunder, Black mites racing for fields and dear life.

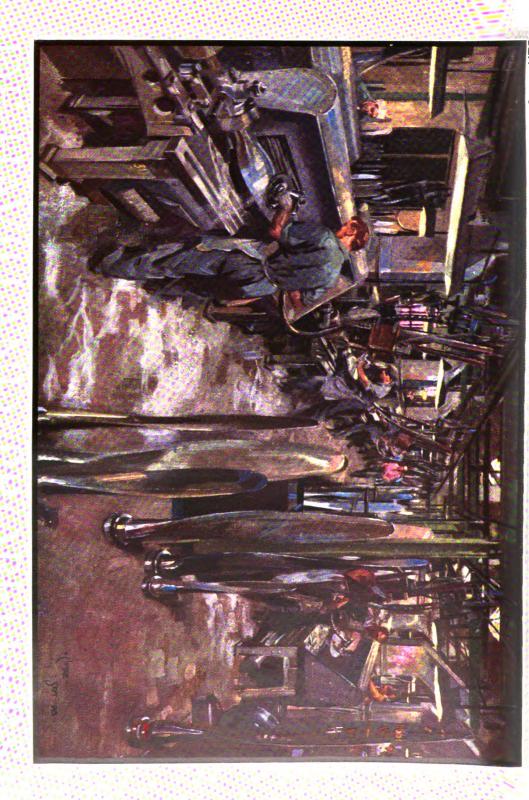
Odyssey over, climbing to skyward, Nosing to north and the wind from the sea-Left behind, for a toast and a byword, Hearts that grew great in the old chivalry.

M. W. J.



GROUP CAPTAIN P. C. PICKARD, D.S.O. AND TWO BARS, D.F.C.

In the attack today - on the trade routes of the future In vast production for the Royal Air Force



A MESSAGE OF CONGRATULATIONS

from

THE CHIEF OF THE AIR STAFF MARSHAL OF THE ROYAL AIR FORCE SIR CHARLES F. A. PORTAL, G.C.B., D.S.O., M.C.

I am glad to send to THE ROYAL AIR FORCE QUARTERLY on the occasion of its fifteenth birthday a message of warm congratulations and good wishes for the future. Throughout those fifteen years the QUARTERLY has rendered good service by stimulating and provoking thought and study of the strategy, tactics and other problems concerning the operations of the Royal Air Force and its sister air forces.

Especially is this true of the past five years of war in which the R.A.F. and the Allied Air Forces have taken part in so many great air operations, whether directly pitted against the German Air Force or in concert with the other Services in the great combined operations in the Mediterranean, in France and over the Atlantic.

THE ROYAL AIR FORCE QUARTERLY has done full justice to all these great achievements and has contributed much to our understanding of them. May it go on from strength to strength during 1945 and in the years to come.



MARSHAL OF THE ROYAL AIR FORCE SIR CHARLES F. A. PORTAL, G.C.B., D.S.O., M.C.

Chief of the Air Staff

Education for the Royal Air Force

By Group Captain C. L. M. Brown

EDUCATION: THE IDEAL

"That man, I think, has had a liberal education who has been so trained in youth that the body is the ready servant of his will, and does with ease and pleasure all the work that, as a mechanism, it is capable of; whose intellect is a clear cold logic engine, with all its parts of equal strength and in smooth working order; ready, like a steam engine, to be turned to any kind of work, and spin the gossamers as well as forge the anchors of the mind; whose mind is stored with a knowledge of the great and fundamental truths of nature and of the laws of her operations; one who, no stunted ascetic, is full of life and fire, but whose passions are trained to come to heel by a vigorous will, the servant of a tender conscience; who has learned to love all beauty, whether of nature or of art, to hate all vileness, and to respect others as himself."—T. H. Huxley (19th Century).

EDUCATION: THE PRACTICAL

"When I went to the National School—we paid threepence a week, y'know—we used to learn our tables by singing all together in a chorus: 'Twice one are two; twice two are four; twice three are six.' I don't suppose as they'd think much o' that method now, but, by goom, I learnt my tables and I learned to do arithmetic and get my sums right—and that's more than they do for Edwin at his posh school."—Yorkshire Business Man (1944).

YAR, it seems, begets an interest in education. Even at the lowest utilitarian level the demands of war reveal the poor educational equipment of a major part of the people of this country as a source of weakness and inefficiency in our national economy. But beyond this, war awakens our consciences and quickens our sensibilities. The endeavours of the past five years have brought all classes of the community into close contact with one another. Together we have experienced and shared hardships, dangers, griefs and hopes. Many of those more fortunately placed in the social order whose lives previously had lain apart from the daily lives of what are perhaps rather disparagingly called "the masses" have been moved to an ampler conception of citizenship and the bonds of national community. On the battlefield, in the blitz, in factories and hospitals. they have seen the courage and fortitude of these poorer sort of people, and the indomitable tenacity with which they strove to defend and preserve their country—in whose material prosperity they seemed to share so small a part. And many who have seen this and recognized it as the source of our strength, the rock upon which victory has been built, have been stricken in their hearts and consciences. It has seemed to them an intolerable thing that large numbers of our people, indeed the majority, should through the poverty of their education be deprived of so many of the better things of life which their more fortunate fellow-countrymen have long regarded as the ordinary amenities of a civilized society.

But the matter goes deeper than this. War, because it is at once senseless and catastrophic, makes us think about fundamental things. Men question the fabric of society and the standards by which hitherto they have been content to live.

Moved by this impulse critical eyes have been surveying the structure of our national life and, underneath the more superficial defects which the scrutiny reveals, many thoughtful people see what they take to be a graver and more deepseated malady. Our civilization (it seems) has gone wrong because it has mistaken life's true values; because it has forgotten that man does not live by bread alone. The striking accomplishments of science and the mighty edifice of mechanical power have caused our generation to attach an altogether exaggerated importance to material things. Machines, in the 19th century, and the wealth they produced became our gods. Hence the evils of our day, through which, starved in spirit and barren of ideals. we have floundered into the malevolent reign of Hitler and the most terrible of all wars.

Those who make this (to my mind rather severe) diagnosis of our case turn to education as the first instrument of redemption. Having asked the ultimate question, "What is the purpose of life?" and having agreed upon at least a provisional answer, it follows inevitably that we must instruct ourselves and our fellows in the way of that purpose. Naturally, all are not agreed exactly upon the methods, or even the precise whereabouts of the goal. But upon one thing all are unanimous: our aims in education must not in the last analysis be directed to materialistic ends but must concern themselves with higher values appropriate to the spiritual

nature of man. There is a vigorous repudiation of the materialist's creed and of all the implications involved in his view of life.

Those, I believe, are the causes from which have sprung that concern for education now so widely expressed. To me the particular interest in Squadron Leader Ginnett's article "Education for Greatness" lay less in his plea for a reassessment of "values" (in which I cannot fail to recognize some of the impulses by which I and many of my contemporaries were moved at the end of the 1914-18 war), than in his suggestion that, when peace-time comes, the military services should be made an exemplar to the nation of what education should mean in the life of a community. That I think is a sound practical suggestion and I can see no reason that it should not be carried out. It is something which could actually be done; it is a task within manageable compass. Plans for the wholesale regeneration of mankind are as a rule easier to make than to execute. But plans for providing a first-class system of education for the Royal Air Force are well within our powers not only to make but to implement. The foundation, if I may say so, is there already: it was laid more than twenty years ago under the inspiration and guidance of Lord Trenchard.

As I have been working since 1922 as an Education Officer in the Royal Air Force, perhaps the most useful contribution I can offer to this discussion is to describe in outline what I think should be the aim and direction of education in the post-war R.A.F. Such views as I may express will, it is understood, be entirely personal.

I do not, I hasten to say, propose to present the reader with any sort of detailed "blue print" for the R.A.F. educationist of the post-war years. Nor have I much expectation of being able to compose a balanced and comprehensive essay on this important subject. For the most part I shall be, as they say, "thinking aloud," and I should like to apologize in advance for any lack of cohesion or symmetry which may result from this rather slovenly literary method—the last resort of those who are pressed for time.

As far as possible, I want to write about "education" in the ordinary sense in which the word is understood. I am always a little uneasy when I am asked to think of education "in the widest sense of the term," because that sense may become so very wide as almost to lose its common meaning. By "education" then I shall try to mean some planned system by which people increase their knowledge and un-

derstanding, enlarge their capabilities and enrich their experience. That, I trust, will not seem too narrow a working definition.

What sort of educational programme does the Royal Air Force need? Well, I should say that (to speak in broad terms) we must keep three necessary requirements before us.

First we must have—I use the expression a little reluctantly—a philosophy of education. We must have a discernible purpose to which all our educational activities are capable of contributing. As one cannot arrive at a philosophy of education which is unrelated to the philosophy of life, and as that is a subject I should prefer not to explore at this point, I will say only that our basic philosophy must be generous and humane; suitable, that is, to the wants of human beings.

Then, secondly, our scheme of education must be appropriate to the Royal Air Force. Education quickly becomes a sham unless it satisfies needs which are real, and it will usually be a failure unless it satisfies needs which are felt to be real by those for whom it is provided. Therefore, within the compass of our basic philosophy we must have a secondary and very clearly vizualized notion of "education for the R.A.F."

Thirdly, our educational machinery must be adequate and it must be efficient. The secondrate and the second best will never do at all. When we are dealing, as we must be dealing, with the minds and characters of men the inferior article is pernicious and unworthy. An Education Branch, staffed by officers of firstclass calibre and varied experience and backed by a competent and flexible organization, is a sine qua non. We must have good accommodation and the best equipment. Accommodation is especially important, for if it is properly designed and of an adequate kind it will itself make a positive contribution of educational value. A study room or a library which is dull and depressing or which suggests an atmosphere of indifference and neglect is worse than insufficient. It speaks aloud the words, "This is the importance attached to education on this Station." Lastly, there must be an adequate allocation of time. As Squadron Leader Ginnett has said, there can be plenty of time for education in peace. Briefly, we must take our Service education seriously and accord it a proper place in the order of Service priorities. Highsounding aspirations and liberal policies are of little avail until they are translated into terms of work on Stations. I am not advocating unmeasured financial extravagance. The difference in cost between the best and the mediocre is small. The difference in true economy—value for money expended—is great.

So much for generalities. What shape is our education to take at the decisive points where it makes impact upon the men and women of the Service?

Clearly, R.A.F. education must carry a strong, I am tempted to say a predominantly technical element. Nearly all the officers and airmen who enter the Service are prompted to do so by their interest in machines. Technical processes and the adventurous work of engineers have kindled their imaginations. Most of them, moreover, need expert knowledge, understanding and skill in a technical field if they are to do properly their Service jobs and gain advancement in their Service careers. Any system of Service education which failed to recognize this, which did not aim to foster and expand these interests and to perfect these skills of hand and brain would be woefully out of touch with realities. It would be neglecting to cultivate what I am obliged to recognize as a rich and fruitful soil in the field of values.

I stress this point only because one observes a tendency to divide "education" into compartments. On the one and inferior side are placed those activities variously and rather disparagingly described as "mere technology," bread-and-butter instruction" or "vocational training"; while in the superior hemisphere we are privileged to explore the richer fields which provide sustenance to the spirit—an appreciation of the arts, of beauty, of the nature of human relationships and the social virtues. Only to the latter, it is sometimes implied, can the term "true education" be given. The others, necessary as they may be in our modern world, are dismissed as "utilitarian."

Frankly, I regard this as a heresy. I should possibly explain that I have no personal or professional bias towards technical or scientific subjects: quite the reverse. My own education was classical, or literary, or whatever is the correct description. No one could be less interested in machines than I. I do not even know what causes my own car to start, and never quite overcome a feeling of wonderment when (as is usually the case) it does. But I have come to believe that education is indivisible; that to relegate to a lower order those manifold activities by which, in the simple phrase, we "make a living" and in which we pit our intelligence and imagination against the blind purposeless forces of the natural world is a mistake. There is one excellence of the artist and another of the technician and we should accept them both as parts of our common human virtue.

Therefore I think we ought to direct our Service education not only towards the highest degree of technical efficiency and the broadest understanding of technical theory and principle, but also towards an even more important aim —that of making the daily activities of the workshop and hangar and armoury a contribution to "the good life." We must not abandon them to the "utilitarian." There is virtue in doing anything well, and in a community so predominantly technical as the Royal Air Force there must surely be found an element of "the good life" within the sphere of its daily work and primary interests. In Shelley's words, "the soul's delight is in doing," and the man who finds that quality of delight in his daily job will not be altogether starved in spirit.

There is another task which Service education must not shirk—that of providing a firm grounding in the rudiments of learning. One must master the tools of education as of any trade. It is to be hoped that an improved system of national education will take a great part of this task out of our hands, but until it does so we must make good the deficiencies. To take a simple example, I should estimate that scarcely more than 20 per cent. of men and women of the war-time Air Force can read well enough, or are sufficiently practised in reading, to derive much benefit from the written word. The world of books, those greatest diffusers of ideas and culture, is permanently closed to a majority of them. We shall not get far with any plans for enlightened education unless we remedy this state of affairs. Similarly, large numbers, by their lack of ability to manipulate figures at an elementary level, are debarred from advancement in skilled and semi-skilled trades otherwise well within the compass of their natural intelligence and aptitude. We must not, I repeat, shirk this task. Official Service examinations, of which in the peace-time R.A.F. there was a considerable number—promotion examinations at various ranks and the like—provide an incentive to this kind of necessary if unexhilarating study. I don't like these examinations, but I think they have their use. There is room here for new and experimental methods of instruction. The traditional methods of classroom teaching suit some, and because in the nature of things they have suited those who afterwards became teachers, there is perhaps a mistaken tendency to think that they are the only effective ones. I have not space to pursue this subject here, and I will refer only the cinema and the synchrophone as examples of new methods of instruction of which I believe many will be found, and which may help to eliminate that pathetic and ageold inhabitant of the classroom, the allegedly "stupid pupil." I have long suspected the "stupid pupil" to be often nothing worse than the unhappy victim of pedagogic orthodoxy.

I have so far touched upon technical education and upon what can perhaps be described as basic educational instruction. Both must (the latter at least for a considerable time to come) have a place in our design. But they must be part of the general pattern. Just as it is an error for people to think that education is merely something which fits them for a "career" and pays a dividend in £ s. d. or social status, so it is wrong to go to the other extreme and suppose that education is intended only to fit us to use our leisure in a worthwhile way. We should, I feel, not take too narrow a view of the sphere in which our "good life" can be enjoyed or too one-sided a view of the values which go to its making.

It would be a great mistake to suppose that before the war education in the Royal Air Force was merely, or even primarily, a sort of appendage to technical training. Anyone who supposes that to have been so must have been unacquainted with the work of the R.A.F. Educational Service during its first twenty years. As long ago as 1923 aircraft apprentices under training at No. 2 School of Technical Training, Cranwell, studied a course of World History. Empire History and Citizenship. They read (and often acted) as part of their school course not only Shakespeare but the plays of Shaw, Galsworthy, Barrie and other modern writers. In their "Set Tasks "-a piece of original work submitted as part of their final passing-out examination they had the widest choice of subjects, from Architecture to the Legacy of the Ancient World or the Problems of the Middle East. They had access to a first-class modern library.

The General Education Scheme, developed subsequently on Stations, was little if any less liberal in conception. The study in outline of World History was (perhaps a little too ambitiously) a compulsory subject in Part 1 of the Higher Education Test, and modern languages, English literature, economics and a wide variety of other subjects could be studied (and were studied) in the latter parts of this three-year course for the Royal Air Force Educational Certificate. There was nothing stuffy or "utilitarian" or unprogressive about R.A.F. education as it had developed up to the outbreak of war

Education on Stations (as distinct from Training Establishments) was one of the earliest casualties in September, 1939, and when

in the following year it was re-established it had to start from something rather worse than the beginning. The R.A.F. was expanding at a great pace. New Stations, hurriedly constructed, had neither libraries nor accommodation. There was a shortage of Education Officers, and those recruited were new to Service conditions and had a tough and difficult job to tackle. Moreover, a large part of the R.A.F. was continuously engaged in combat with the enemy and the remainder was strained to the utmost in tasks of training and maintenance to meet the needs of the operational commands.

The pre-war machinery of education had gone, and would in any event have been unsuitable to active-service conditions. Thus we had to improvise, and at first much of our improvisation was sketchy and inadequate. But the need was there. Slowly, in the teeth of great difficulties, a new "General Education Scheme" grew up. Faced with the necessity of providing for thousands where before there had been hundreds, new ideas and new methods were introduced to supplement the traditional ways of instruction. Gradually new purposes and new possibilities began to take shape.

Air Vice-Marshal Thorold, in his article "Education for Living-Its Practical Application," has described some of the educational enterprises which have developed in the R.A.F. during the war. Of these, Discussion Groups and Information (or News*) Rooms are perhaps the most noteworthy and successful. Though not yet universal, they are now widespread throughout the R.A.F., both in this country and overseas. There is no need for me to repeat what Air Vice-Marshal Thorold has said about them. To some extent these and the related activities he describes represent a new and lively educational technique. They have, I am sure, come to stay (or perhaps I should say to grow) in the R.A.F. The Discussion Group, in particular, is significant as a development of community self-education. It is full of rich possibilities, not yet fully explored, in the field of social and Service relationships. As an "educative" medium it must not be thought of as standing alone, as it is too often obliged to do under war-time conditions. Later, when it is linked with other activities—study circles, libraries, lectures, etc.—it will prove of even greater value and interest.

By these and similar means, as well as by

^{*}They are the same thing, variously named on different Stations. I personally prefer "Information Room"—see Concise Oxford Dictionary: "inform, v.t. and i. Inspire, imbue person, heart, thing, with feeling, principle, quality, etc."



the more traditional methods of education we shall seek to lend warmth and colour to our design. All worthwhile activities must be within our compass. In short, we want to see a balanced system of education operating as part of the normal life of the Royal Air Force, and drawing its strength and inspiration from the needs, collective as well as individual, of the Service community. We can retain the good and generous traditions of our pre-war education, while developing them to satisfy the demands of a new generation and a new Service society. We must remember that education is a key that opens locked doors—doors which have hitherto been closed to so many. They must be thrown wide open. The world of ideas, the heritage of our national traditions and culture, the world of beauty accessible through literature and the arts, the sense of constructive social purpose which is the mainspring of a democratic community—all these are our concern. They must be made integral to the life of the R.A.F., which must in itself be an education-vocational, technical, liberal, I draw no artificial distinction—so that those who make it their careers may leave it with the consciousness that they have actually experienced a "good life."

There is one other feature of war-time education which I would mention. The R.A.F. always maintained contact with the wider stream of civilian education, and during this war the contact has been strengthened and coordinated by co-operation with the Central Advisory Council for Education in H.M. Forces, and its Regional Committees centred in the Universities. This is not the place to write of the work of these institutions, but one feature of our collaboration has impressed me very much. For a variety of purposes—the study of current affairs, the training of Discussion Group leaders, etc.—residential courses have been arranged, often at Universities, for Service man and women. This valuable wartime amenity should certainly be preserved and greatly extended. For officers and others to have the opportunity to spend a short period in the atmosphere of a University—so different, be it said, from that of a Service Station studying something which for preference has no direct relation to their professional duties, meeting people among whom learning and scholarship are among the major "values," making contact with cultured minds and with ideas, is surely a most desirable experience. I hope the Universities and other educational institutions, will, during their vacations at least, continue to open their doors to the R.A.F., and

on a far wider scale than has been practicable during the war. More than that, I hope that the Service itself may maintain short courses at schools of its own-of which the R.A.F. School of Discussion Method is a prototype—devoted not to professional instruction, but to broader educational, intellectual and cultural ends. The Service, I am quite sure, would greatly benefit thereby.

I ought not to conclude without saying a word about incentive, which is a particularly important element in the education of people who have left school. Without incentive, without an eager wish to learn, we shall never do very much good, and in the nature of things the incentive of compulsion cannot be applied to the minds of grown-up people. Interest is of course the best of incentives; it makes learning easy and quick. Needless to say, we must see to it that our Service education is made interesting, so that it strikes that vital spark which sets the mind alight. There are many ways by which this can be done; Air Vice-Marshal Thorold described some of them in the article to which I have already referred, and we must find others. Even when a subject, or a particular stage of a subject, may lack immediate interest, skilful instruction can fill the gap, for the mind derives some pleasure and satisfaction from the process of learning, when knowledge and understanding are built up in an orderly and logical way.

But there is something more than this. We have, I am often told, to break down a sort of shyness or mistrust of education, the feeling that it is something which belongs only to childhood. Some senior Service officers whom I respect are very much concerned about this, so much so that they hesitate to use the word education," even when that is what they mean. Their view is that if it is to be "put across" to the "average chap" we must call

it something else.

My own experience suggests that this belief is largely a mistaken one and that at the present time there exists among Service men and women who left school at the age of fourteen a growing realization that their lack of education is a great handicap to them, a handicap which they justly resent. But even when the suspicion or dislike of education persists, I believe that we only tend to foster and perpetuate this attitude of mind by seeming ourselves to share it, by saying in effect, "Here is something worth having; here is something you will profit by and enjoy; don't imagine that we are offering you anything so dull and humiliating and unmanly as education."

That method of approach, in whatever form it takes, is in my opinion wrong. Even at the expense of immediate and facile success I am certain we should avoid it. If in many minds the associations of the word "education" are distasteful, then let us use all our influence, all our prestige of leadership, all our conviction to give the word another association—one of hope for the future. Let us not be afraid to say that education involves hard work and discipline of mind. Let us be honest about it if in fact we believe in it.

I believe in education, I believe it is essential to the health of a democratic community, because in the long run the uneducated have no weapon of defence against the educated except that of brute force. I believe in it because every ill-educated man and woman is a loss to the community. I would not go as far as to say that education is essential to happiness or virtue—for which the recipe is not certainly known—but I believe it is a powerful contributor to both.

How shall I sum up these rather disjointed comments? The point I should most like to stress is my belief that education is indivisible. We must not be men and women of culture and of high endeavour only in our leisure hours. We must not have two sets of "values,"

one for "living" and another for "making a living." The Athenian Greeks could perhaps think in those terms, because the economic structure of their society rested upon slavery. Our own civilization of the western world has for too long rested not upon slavery but upon the labours of an uneducated majority deprived of many of the more gracious elements of "the good life." It is surely the supreme task of democracy to remove this age-old inequality. One way to do it, I believe, is to think of "culture" in terms of daily life and work, not as an ornamental icing, but as good fruit found within the cake itself.

"Greatness," perhaps is a sort of residuary power which we can evoke at need to meet the challenge of great events. It may be that we ought not to think about it too much or too self-consciously. There may be times when, in quiet intervals, we can put off the burden of conscious greatness and cultivate our gardens, play cricket, read or write a little poetry and enjoy the incomparable beauty of our country—replenishing, as it were, the well-springs of our native genius. All this, I believe, is the stuff of true greatness, and its central core must be our daily work. It is with all these things that our education must be concerned.

Memories of the R.A.F. Mission to China, November, 1941

By "DILWARA"

ARLY in 1941 the British Government decided to give China something more than moral support. A force was to be manned and maintained by volunteer R.A.F. personnel in civilian clothes, operating on the precedent time-honoured by the Spanish Civil War. The freelance, mercenary basis was, of course, necessary in view of the state of uneasy peace then existing between Great Britain and the fatherland of the opposition.

To avoid any suspense I will say now that the prospective force never reached China, partly owing to the declaration of war by Japan and partly, of course, because the essential aircraft never arrived in the Far East theatre. Some of the ground equipment did turn up in Rangoon, however, and this range of three months' maintenance spares for one Buffalo squadron proved to be as manna from Heaven in the days to come, when Burma was fighting for its existence.

At the time my story begins I was filling the appointment of Chief Equipment Officer, No. 221 Group, Burma, doubling with its obvious responsibilities a half-dozen others not officially established.

One day in November, 1941, my C.O. was informed by signal from Air Headquarters, Far East, that four officers were due to arrive in Rangoon, on their way to China to investigate the facilities there available for the proposed ex-R.A.F. wing, which was to be located in the province of Yunnan. He was told to release an Equipment Officer to complete the party, which then consisted of Group Captain Bishop, in command, Group Captain Watts, Wing Commander Moloney and Flight Lieutenant Sturrock. The choice of an Equipment Officer

presented no great difficulty, there being but one in the country, and in due course I was

given my movement orders.

Before we left Rangoon the Mission was kind enough to demonstrate its faith and trust in its new colleague by appointing him honorary treasurer, bill-payer and tip-negotiator-inchief. Armed with wads of Chinese bank notes, cheerfully issued by a local bank in exchange for good Indian rupees, my own miniature camera and twelve spools of film, I left Rangoon for Lashio on 20th November in a Blenheim from No. 60 Squadron, in company with the other members of the party similarly mounted.

Two days were spent in and around the almost virgin R.A.F. Mess and airfield at Lashio collecting the rest of the adventurers. It was our very good fortune to have been offered a passage to the capital of Yunnan, in a private-charter DC3, which was to make the first air survey flight from the new field at Dinjan, in Assam, to Kunming. The route lay over the south-eastern Himalayas, via Fort Hertz, Likiang and Yunnanyi, a route since made famous by the American Air Transport Command, and popularly known now as the " Hump."

After the usual delays, which were accentuated in the departure by air of a mixed bag of Chinese Government officials, C.N.A.C. executives, American cartographers, R.A.F. officers on civilian duty, and philatelic enthusiasts, assisted by a Burmese ground crew and Indian Army well-wishers, the DC3 took off on Saturday, 22nd November, at about 1300 hours

for Dinjan.

In the capable hands of "Chuck" Sharp, senior pilot and operations manager of the C.N.A.C., we made a fast run to Dinjan via Myitkyina, spending some minutes making a wide circuit of the airfield in order that the teaplanters for twenty miles around might have the opportunity of leaving their tennis parties for the landing-ground, and of offering us all hospitality for the night. Without this well-founded hope, the prospects were somewhat dim. Subject to correction, I think that ours was the first passenger-carrying aircraft to arrive in this once remote spot, and it created no small amount of excitement. Having made sure that all the tennis parties were in their cars and on their respective ways, we landed and stood around the aircraft, awaiting events.

The first to arrive was the local Police Inspector, who was a bit shaken by the appearance of seventeen bodies, of various nationalities, direct from a foreign country, Burma to wit. Not for long, however; ten minutes sufficed to produce some sort of rubber stamp with which to consummate the holy rite of passport inspection. We were the first air passengers to be checked through the Assam customs.

This over, the party was slowly submerged under a rising tide of British pioneers of Empire and their better-looking halves. Sturrock, an inarticulate Chinese official of the Ministry of Agriculture and myself had the great good fortune to be adopted by Mr. and Mrs. Jimmy Grayburn and carried off to their palatial home some ten miles away. The "C.O." and his fellow Group Captain did not fare quite so well; there is a moral here which it is not necessary to pursue.

The stay in Dinjan is irrelevant, and it will be sufficient to note that the party given by, and in, the local club that night beat all pre-

vious records by a wide margin.

Next morning we left just after eight o'clock for the inaugural trip over the "Hump." The experts crowded the nose of the aircraft with their cameras and instruments, intent on filling in some of the white gaps in the map of this region. The aim was to survey the route for a new road to China, now known as the Ledo road. I was interested to find afterwards, in Kunming, a Chinese map which clearly showed not only the projected route, but a road actually This map I treasure as a fine in existence.

example of enthusiastic optimism.

The Mission proper, being supernumerary to this intellectual concentration, drifted about the cabin admiring the view. The weather was perfect, blue sky with a few woolly rolled-up feather-beds floating about. Nothing is more certain than that the audible admiration would have changed its tune very quickly had it been otherwise. The DC3 could not make more than about 18,000 feet, and we were therefore doing a sort of hedge-hopping trip over the roof of the world. Crossing the Burma frontier again, we passed over the lonely Fort Hertz. The aweinspiring sight of the Salween, Mekong and Yang-tse gorges in view at the same time faded astern. We circled the amazing walled town called Chung-Chien-Chen, or Chungtien, and soon afterwards the aircraft was slipped steeply earthwards for 10,000 feet to make a superb landing on the very tight and stony little airfield of Likiang, tucked away under the lee of an imposing wall of rock and ice.

A most amusing half-hour followed, whilst the doctor recovered from his sickness ("You don't need oxygen at 18,000 feet; it is ridiculous"), and we watched the poverty-stricken local inhabitants scorn biscuits and chocolate, only to fight like wild-cats over the empty tins. The women were as ugly as sin, and as happy as sandboys when they were not scratching each other's eyes out; the men were the reverse, dour and uncommunicative. This half-forgotten race are said never to have seen a tax collector, had a bath or bought a new piece of cloth. I believe it all.

Likiang having been unanimously dismissed as of little operational interest, we took off, only just, for Kunming via Yunnanyi, arriving there in the early afternoon. Now we, the Mission, really started work.

Led by our mentor and friend, the Air Attaché to China, we were introduced to the usual galaxy of smiling faces and shepherded into the usual enormous American cars. Our destination was the No. 1 Hostel, formerly the Agricultural College, on the other side of the town, near the terminus of the Burma Road proper, with its crossing-gates, congested Customs houses and petrol dumps.

At the Hostel, which was to be our base headquarters, we met for the first time the enormous General J. L. Huang. This clever, genial man was built like a bull, with an infectious laugh on the same scale. The Director-General of the War Area Service Corps, a title which hid a multitude of activities, and his Associate Director, Spencer Shih, were the fount of all information and help, a fount that never failed and which impressed most by the air of ease with which results were obtained.

General Huang had originally set out to provide, by the end of July, 1941, accommodation, messing and recreational facilities for 264 men at each of the cities of Yunnanyi, Kunming and Chan-yi, the latter some 130 miles to the east of the capital. This he had, of course, done; Directors General do not often fail in China. When it is realized that he had not merely to organize locally-recruited labour and materials, but had had to buy, and ship, from Hongkong and Rangoon items such as Aga cookers, ice-cream freezers, whisky, hardware and cigarettes, you may appreciate that it was no simple job.

The accommodation was furnished to a scale rather more comprehensive than that allowed for single officers in Britain—and the scale did not differentiate between officers and men. The services of a barber's shop, tailor's shop and laundry, hot and cold showers and baths were available at every occupied hostel, irrespective of its location.

The diet was standardized and excellent. A gross charge for the messing was made for each unit, and not in detail to individuals. A sliding

scale, varying from place to place, had already been drawn up; at this time it was fixed at \$29 National Chinese, or about 5s. 6d. sterling, per head per day in Kunming. All other services, including accommodation, light, service and simple condiments, were free.

Since his original terms of reference, General Huang's problems had increased ten-fold. He now had twenty-seven hostels built, building or planned. I am convinced that all twenty-seven could have been in the first category by the time we arrived, had it not been for the sheer inability to get enough hardware, plumbing, dry goods and foreign-style rations over the congested Burma road, in competition with priority war materials.

There was a further reason for the delay at some sites, a reason which hid in the background and did not figure in polite conversation. The Chinese were becoming a little cautious, and were holding on to a central reserve, waiting for something definite in the shape of aircraft. I cannot say that I blamed them.

The Director-General did guarantee, however, that given one month's notice he would provide complete accommodation and messing anywhere in Free China. The more I saw of him and his department the more likely it seemed that this was no idle boast. As we could not possibly move the ground personnel from wherever they were to China in less than a month this guarantee disposed very satisfactorily of the first of my worries. I will go further, and place on record my admiration for the way in which water-borne sanitation, tennis and football grounds, hygienic cooking arrangements and efficient service were laid on in districts remote from any facilities of like kind, farming districts which were living generally as they had lived for the past two thousand years.

To continue the itinerary. We all left Kunming on Monday the 24th, in the DC3, for Si-Chang, or Ning Yuan Fu. This airfield, about one and a half hours distant by air from Kunming, lies five miles from the city of the same name, on the east bank of the river An-Ning-Ho, north-west of the provincial capital.

An all-the-year-round road, half-metalled, connected the "city" with the Burma Road near Yunnanyi, two and a half days away by lorry, making six or seven days from Lashio. The doubtful 3-ton limit on all its multiple bridges looked like being a severe handicap. Facilities were more than a bit rough; Si-Chang was listed as one of the places to be ready in one month. How it was to be done we did not enquire. Presumably General Huang had a remote ancestor of the name of Allah-ad-din.

Leaving at 1245 hours, we arrived at Chao-Tung-Fu, at the other end of the base of a triangle whose apex was Kunming. Very similar country to the first port of call, with the usual P.O.L. scattered around the district, and medical facilities of a sort in the neighbourhood. We were not very impressed.

The party returned to Kunming, where I enjoyed the satisfaction of paying for all the drinks out of other people's money. It is worth noting that all purchases of occidental luxuries had to be paid for in foreign currency, prefer-

ably U.S. dollars.

The following day we split up and went our diverse ways. I carried out a swift survey of the maintenance possibilities in and around Kunming, and was amazed at the extent to which development had been carried. Passive defence by dispersal was an object lesson in itself that afterwards stood me in good stead.

The vast and varied stock of obsolete aircraft and engine spares held by a very efficient A.E.D. was not quite so surprising; to find that what at first seemed to be a bewildering system of vouchers for recording and issuing stocks was nothing but a straightforward copy of A.P. 830, Volume I, gave a delayed action feeling of confused embarrassment.

An aircraft factory, well equipped and actually in production, was the next surprise, and a relief to my engineering worries. It is worth remembering that Chinese coolies, descendants of generations of agricultural workers, were being transformed into passably skilled machine operators in six months. There is food for thought here when considering the future development of the "Yellow Peril."

On 26th November, Group Captain Bishop, Wing Commander Warburton and I flew, in the most incredible Beechcraft ever to get off the ground, to Chan-Yi, quite the best of the future operational stations we visited, Kunming

excepted.

The Chinese pilot, despite being two hours late, taking off in the middle of an air raid, with a W.O.M. on board but no wireless, Hamilton propellers like sword-fish beaks, tail unit in ribbons and hydraulics of parson's egg

variety, did get us there in one piece.

This magnificent airfield lies near the old walled city of Chan-Yi; it is on the main China highway from Kunming to Chungking, six miles beyond the railhead of a very uncertain railway organization. 2,000 yards of metalled all-weather runway, with a secondary strip 1,600 yards long, perimeter tracks and dispersal points, made a most agreeable picture. All this had been constructed in a ridiculously short

space of time, in typical Chinese fashion, using the minimum of machinery and countless thousands of labourers, men, women and children.

The hostel on the hill overlooking the field, itself at 7,500 feet above sea-level, was a masterpiece of camouflage on bare ground. Running hot and cold water was provided by the very simple means (to the Chinese) of employing coolies to carry buckets-full of water from the village wells a mile or more away, up the hill to a sump a hundred feet above the bathhouse. It was pumped from here by a sort of perpetual motion, two-man driven, semi-rotary pump, into a 200-gallon tank on stilts. From the tank it ran down into a boiler made out of two 40-gallon petrol drums, which was faithfully tended by another coolie with sticks and animal dung fuel brought by the rest of the fatigue party.

Within this Heath-Robinson holy of holies were white tiles, chromium plate and towel rails, far superior to the facilities provided by

any hotel in the capital of Burma.

Large stocks of P.O.L. were hidden in the district, under bushes, amongst gravestones and in native-style houses. Most of this fuel I had despatched from R.A.F. stocks in the vicinity of Mandalay some six months previously, and it was a relief to find it so well cared for.

After the infinite trouble taken in Singapore and Malaya to avoid trespassing on supposed Chinese religious susceptibilities, it was disconcerting to find almost every temple full of H.E. bombs and millions of rounds of S.A.A. of all sizes, British, American, French, Russian, with a sprinkling of Chinese home-made products to flavour the whole.

We spent a most interesting day here, with the assistance of the charming Station Master, whose rank as a Barrack Officer contrasted ill with his former high appointment in the Consular Service in Australia. Whatever the cause of his change of station, we were the gainers. It is a very real pleasure to meet the delightful simplicity and honest goodwill of a Chinese gentleman of the old school.

Having given Chan-Yi full marks, except for its engineering maintenance facilities, which were not very conspicuous, the appalling Beech-craft landed us the next day at Yangling, half-way back to Kunming. Here there was a delightful hostel, at first sight very much like Gloucester's famous New Inn minus the creepers. This impression did not long persist.

Yangling was not in an advanced state of preparation, no metalled runways, no power, no night-flying facilities, and very little of anything else except people and petrol. The local

staff made up in enthusiasm what they lacked in material, and deserved nothing but praise.

Having definitely had enough of the aircraft by now we finished the trip by road, arriving shaken but safe after a hair-raising journey in a Chevrolet station wagon, which was much too fast for its driver's ability, the state and congestion of the road and our somewhat jagged nerves.

This, however, was only the hors d'œuvres. The joint followed next day, when the necessity of reaching Yunnanyi quickly forced me into a Yale (N.A.) trainer, as passenger to a pupil under instruction, flying lead in a formation of three.

Kunming lies about 7,000 feet above sealevel. A few miles due west of it, in the direction of my goal, there is a vertical escarpment 3,000 feet high, the doorstep to a wide rolling plateau. This escarpment was, as it usually is in the early morning, submerged in thick mist which rose to the ten-thousand-feet mark. My gallant pilot gave me twenty-five of the most hair-raising minutes I have known by solemnly plodding up the valleys through the fog at an average altimeter reading of 9,000, blandly saying in answer to my small-voiced queries that "he had been this way before." I have never expected to enjoy flying in fog fifteen hundred feet below the known ground level, and never will.

Having eventually persuaded my little teddybear of a driver to squeeze eleven thousand out of his aircraft, he grinned like a maniac when two of our three aircraft broke cover within forty feet of each other, and within a hundred yards of a "mole-hill" considerably higher than ourselves. The third aircraft appeared immediately over my head. I just sweated on.

Without maps or compass, we safely made Yunnanyi, the first town of any size on the Burma Road inside China. Not that this infers a city. It is a small place, much smaller than a Cotswold village and very, very dusty, thanks to the endless stream of five-ton Juggernauts that used to hurtle down the last three miles of road flat out.

Nevertheless, it was an excellent base for our purpose. A fine new hostel was nearly finished, with tennis, baseball and basketball courts; there were many Americans about, all wearing the leather battle-dress blouse which was recognized as an unofficial uniform, so that it was impossible to tell the difference between one of Colonel Chennault's aides and a beachcombing truck driver.

I enjoyed Yunnanyi and I enjoyed Chan-Yi,

but best of all was the place, not to be mentioned by name, where the Chinese Government extreme lay-back Headquarters are built. Tucked into a hillside which rockets up to the snows, little Swiss chalet-type bungalows nestle round their tennis courts on the edge of one of the loveliest lakes I have ever seen. Never shot over, teeming with game, inadequately fished, six thousand feet up, the abandoned bungalows would be a paradise for a month's leave. Fortunately there is an airfield of sorts near by, as there are no other means of transport that will get you back to civilization inside a week. Never yet used, I can but hope that it will never be used for the purpose for which it was originally designed.

Two days in Kunming followed, where we got together, drafted our voluminous notes, and discussed our conclusions with General Huang and the Air Attaché. Somewhat vague conclusions they were, based on a premise which remained dark with uncertainty.

All this time we received hardly any news from the outside world. Busy on our own little problems, the growing tension in the East passed us by. It was with light hearts, and a feeling of a job well done, that we accepted the invitation to an official dinner on the final night, expecting much and not being disappointed.

A wonderful meal was served to a company of over forty; the food was escorted by a full suite of wines of laudable vintage. Apart from the trifling error of serving the drinks in the reverse order to that accepted in the West as not only proper, but wise, the butler was magnificent.

Carefully primed beforehand by the indefatigable Air Attaché, we all successfully withstood the continuous massed assault of toasts of "Gambay" or "Bottoms up." Drinking neat liqueur brandy in half-pint tumblers straight off takes a bit of facing when there are several more hours to go. The delicious and typical Chinese habit of throwing their captains and majors into the breach first, leaving the noble and serried ranks of generals (military, air force, political and nondescript) to take up the challenge, fresh and fighting fit at a later stage of the evening, must be taken as a compliment to worthy allies.

Full of sweet and sour pork, shark's fin, bird's nest soup, ancient eggs and an assortment of liquors of unquestioned potency, we retired late to finish our beer and quench a very real thirst.

The following day we left hospitable Kun-



ming by the last C.N.A.C. aircraft to fly over the civil route to Rangoon, where we arrived on the night of 3rd December, to find Burma's capital blacked out in earnest, and Stage II in operation.

The Singapore party made two attempts to get home before they succeeded. Of the four who came, one found his death on Tengah air-

field and two more are prisoners of war. Only the signals expert escaped the trap.

I believe that many of the official documents and photographs of the new air route over the roof of the world were lost in Hongkong. My own survived, and to-day they are a precious reminder of a fascinating visit to the hinterland of a fascinating country.

Transport Command—Servant of the Services

By Air Chief Marshal Sir Frederick W. Bowhill, G.B.E., K.C.B., C.M.G., D.S.O.,

Air Officer Commanding-in-Chief

RANSPORT Command is one of the most recently formed operational Commands of the Royal Air Force. It meets the needs of all three Fighting Services and of many civil departments in all theatres of war.

In the crisis which faced this country in the dark days following Dunkirk, it was vital that the Royal Air Force should be built up to a strength capable of stemming the German tide and then of carrying the air war into the Third Reich. Aircraft had to be brought over from North America at a time when U-boats were taking an alarming toll of Atlantic shipping. Space in shipping was scarce and the sea passage hazardous.

It was then that a small band of pioneers in Canada, the United States of America and the United Kingdom made plans for the delivery of operational aircraft to this country by air. The Atlantic had been flown before but never in the conditions or on the scale they

contemplated.

The examination of an organization capable of undertaking the task was begun early in 1940 by Sir Edward Beatty, Chairman and President of the Canadian Pacific Railway, and after careful examination it was agreed that an Atlantic air service on a bomber-delivery basis was feasible. Early in July, 1940, Mr. Morris B. Wilson, representing the Ministry of Aircraft Production in Canada and the United States, wrote to Sir Edward Beatty on the subject of inaugurating this Atlantic Air Service. Wholehearted support and assistance came from the Canadian Government. As a matter of historical interest the initial organization of the C.P.R. Air Service was as follows:—

Chairman.—Sir Edward Beatty, G.B.E. Vice - Chairman. — Mr. G. E. Woods-Humphrey (late of Imperial Airways). General Manager.—Lieut.-Col. H. Burchall (late of Imperial Airways).

Flying Superintendent.—Capt. D. C. T. Bennett (now Air Vice-Marshal Bennett of Pathfinder fame).

Assistants.—Capt. Page and Capt. Ross. (Note.—Bennett, Page and Ross were all

pilots of Imperial Airways.)

In November, 1940, the first delivery flight was made with seven Hudsons led by Capt. Bennett. They took off from an airport in Newfoundland, namely Gander, on the 10th, with only a ten-minute interval between the first and last. The first half of the flight was carried out in formation, but later the bad weather forced them to split up. They all arrived safely at their destination, Aldergrove, in Northern Ireland, with a spread of one hour forty-two minutes. The average flight was about ten and a half hours. They were the forerunners of the 23,000 which have since followed.

In March, 1941, owing to various reasons, it was decided that this organization should come completely under the Ministry of Aircraft Production in London. Mr. Morris Wilson therefore took over this organization, which was then known as "Atfero" (Atlantic Ferry Organization). Mr. Morris Wilson gathered around him many famous business men of Montreal, who gave their services free, except for a token value of a dollar a year.

We owe much to these "Dollar-a-Year-" men whose names I record hereunder:—

Mr. Morris Wilson, Head of Atfero. Mr. H. M. Long, Chief Executive.

Mr. H. W. Thorp, Assistant Chief Executive. Mr. F. B. Walls, Commissariat and Security.

Mr. J. H. Norris, Chief Civil Engineer.

Mr. J. Schofield, Chief Architect.

Mr. J. McConnell, Press and Publicity.

Mr. A. D. Dunton, Press and Publicity. Mr. B. W. Roberts, Purchasing. Capt. G. M. Smith, Finance. Mr. J. M. Norsworthy, Accounts. Mr. Hamilton, Assistant to Mr. Long.

Again owing to a change of policy R.A.F. Ferry Command was created, taking over the functions of "Atfero" in the latter end of July, 1941. As A.O.C.-in-C., I had and still have the most valuable assistance of many of the pioneers, including the "Dollar-a-Year" men. From then onwards the activities of the

From then onwards the activities of the Command grew to such an extent that, in March, 1943, it was decided to give it a name indicative of its wider scope. And so, the old Ferry Command passed into history and Transport Command was formed with a full operational status. This operational status has been fully earned, as the aircrews have faced enemy fire in the Far East, in Italy, Malta and later in France, Belgium, Holland and at the very gates of Nazi Germany.

The work of Transport Command is, broadly, the organization and control of strategic air routes, overseas ferrying and reinforcements, moves of squadrons to and between overseas theatres of war, movement of personnel, mails and freight. Its parish is world-wide—it operates regular services which aggregate close on 80,000 miles. Over the Atlantic alone more than 2,000,000 miles a month are flown.

At a very early date, after Ferry Command was formed, the B.O.A.C. took over the running of the North Atlantic Return Ferry Service working under the operational command of the R.A.F. This Service was primarily to return Ferry pilots from the U.K. to Canada, but carried out many other important duties as well. The Corporation have operated this Service for the past three years, both in summer and winter, with outstanding success.

The routes themselves cover the Atlantic seaboard of North and South America from Newfoundland to Brazil. They span the Mediterranean area with a network of services ranging from the Atlantic coast of Africa as far south as Lagos, and cross the Continent to the Sudan, Egypt, Arabia and India.

I have mentioned reinforcement and ferrying, and it is necessary to explain the difference between the two. Ferrying is the sending of aircraft from one point to another, using a Transport Command crew which returns to its base by the quickest possible method to be ready to ferry another aircraft. Reinforcement is the movement of operational aircraft and their crews to war theatres where they will go into action against the enemy. The crew is sent down

from the appropriate Command to a Ferry Training Unit of Transport Command, where necessary adjustments are made and the crew given a course of instruction before being sent abroad.

So much for the routine work of Transport Command. Now let me give a brief sketch of some of its achievements on active service.

Our aircrews received their baptisms of fire during the siege of Malta when Transport Command Hudsons flew urgently needed medical supplies and Spitfire spares to the G.C. Island. Enemy patrols forced them to land and take off by night, and many of the crews made a dozen or more trips to the Island and never saw it in daylight. Often the airfield there was the object of enemy bombing as our aircraft came in with their vital loads. They remained on the ground for as short a time as possible, but they never came away empty. Always there were dangerously wounded and sometimes civilian refugees to be taken away to safety. It may be said that these men of Transport Command played their part in helping Malta to hold out to its final triumph.

Later, when the tide of battle turned in favour of the Allies, Transport Command aircraft were the first to land and take off in Sicily, again landing vital stores and taking away wounded. At one stage in the campaign engine drivers from North Africa were given the highest priority that can be allotted to passengers. They wanted to operate the railways in Sicily and so help to rid the rest of the Island of the enemy.

At Salerno our aircraft were among the first on the beaches, often flying in below our own barrage. As the victorious armies pressed deeper and deeper into the heart of Italy, so Transport Command followed them up, ever in the vanguard with supplies, ammunition, jeeps and even 24-pdr. guns. Tens of thousands of casualties were and are still being evacuated by air and many hundreds of lives saved by the rapid treatment that this made possible. In Burma the Command rendered similar services in the fight against the Japanese, in at least one instance turning the tide of battle by dropping ammunition and other supplies to "boxed in" divisions. And it must be remembered that our aircraft carry out all these operations unarmed; weight cannot be sacrificed to defensive weapons. It is due to the high standard of skill displayed by the aircrews that so few aircraft are lost.

D Day gave Transport Command a supreme test that was to be the climax of preparation and hard training. A special Group was formed whose task was to carry para and airborne troops to the dropping zone in Normandy, follow up with supplies, and return with wounded once landing-strips had been established. How successful this operation was carried out is now well known. In conjunction with United States aircraft and this R.A.F. Group, thousands of paratroops and gliderborne troops and supplies were landed on the target area with only fractional losses. It was some of these men, dropped by Transport Command, who established a bridgehead which was destined to help liberate all France and Belgium in a few short months.

But the work of the Group did not finish with the successful opening of this new front. A constant stream of supplies has been carried over ever since, ranging from blood plasma, whole blood, penicillin and other medical necessities to 500-lb. bombs, mortars and other fighting equipment, and thousands of wounded

have been brought back.

Once Paris, Brussels and the greater part of France and Belgium had been purged of the enemy, Transport Command aircraft helped to carry the war to the very banks of the Rhine by dropping gliders and supplies on selected areas in Holland. One of my pilots was killed by flak, but the navigator carried on and effected a perfect landing in England although he was not a pilot and had never attempted to land an aircraft before. He wanted the rest of the crew to bale out over England, as he feared that his inexperience would lead to a crash, but, to a man, they expressed their determination to stand by him. And their confidence was justi-

Such, in brief outline, is Transport Command's contribution to the coming victory, and when Nazism is nothing but an evil memory the pioneer work we have done will be valuable to civil aviation. Transport Command has offered fine opportunities for keen young men of the right type. Theirs will be the privilege of passing on a magnificent tradition forged in the fires of war.

I cannot finish without a word about our "opposite number" in the United States of America, namely, the United States Air Transport Command, working under the able direction of its Commanding General, Major-General George. We have received in all parts of the world in which they operate the greatest help, kindness and understanding. We are indeed grateful to them.

The Future of the Women's Auxiliary Air Force

By Wing Commander G. H. Everitt, D.S.O., D.F.C.

THE Women's Auxiliary Air Force is an essential part of the Royal Air Force and its members are serving efficiently alongside airmen in over fifty different kinds of work at Air Force stations at home and also overseas.

"During the Battle of Britain the way in which airwomen discharged their duties under the most arduous conditions was beyond all praise, and the high standard then set has been

fully maintained.

Those of us who have had the privilege of serving alongside the W.A.A.F. in this war know the truth of those words and realize that they are not just idle words of flattery. They were written by the Chief of the Air Staff, Sir Charles Portal, in a foreword to a book about the W.A.A.F., less than three years after that service had been formed by Royal Warrant. Let us examine, then, very briefly, the history of this service that has earned such a fine reputation in so short a time.

The W.A.A.F. can really trace the history of their service back to 1918, when the Women's Royal Air Force was formed at the same time as the R.A.F. became a separate fighting Ser-

vice. But after the last war, along with the other Women's Services, the W.R.A.F. was demobilized. It was re-formed out of the A.T.S. and became a separate service on 28th June, 1939, and from then on was known as the Women's Auxiliary Air Force. At the outbreak of the present war the W.A.A.F. was mobilized and from that humble force, which then numbered only two thousand, has grown up the tremendous force that now forms an integral part of the Royal Air Force.

The W.A.A.F. was formed with the object of replacing officers and airmen in certain ground appointments and trades in war-time, but before this object could be achieved there were many obstacles to overcome. Probably the most difficult one was the prejudice of the R.A.F. towards women in the Service. Though slightly amused at the thought of women in the Service, the R.A.F. could not resign itself to the fact that women were really going to replace men. War was a man's job, not a woman's.

I know of several Station Commanders who, at the beginning of this war, were strongly opposed to having the W.A.A.F. on their

stations, but if they were asked to-day if they still had that prejudice, I am sure that they would all admit that they had lost it a long while ago. In 1941 many of us laughed when we read that batwomen were to be introduced into the R.A.F. How could women carry out batmen's duties? The answer was soon to be found—the women did the batmen's duties, are still doing them, and I can say from experience that on the whole they are doing them very well.

The few people who do adversely criticize the W.A.A.F. can support their arguments quite well by quoting instances where certain individuals do not take their work seriously enough, but we must realize that these are only isolated cases and that these "bad types" form only a very small percentage of the whole force. It would be just as easy to make the same criticisms about the R.A.F., and in comparison I would say that many of the women are inclined to be keener and more conscientious workers than the men. They are often found to be more suited, either temperamentally or by virtue of a natural inclination, to certain types of work. For example, it is generally accepted that women are far better suited than men to stenographic work and work that is of a monotonous nature. Another example is that of the radio telephony operator; a woman's voice over R/T can be received far more distinctly than a man's voice.

Of course, it may be argued from the woman's point of view that women are given little opportunity to train for anything else except routine work and would be just as efficient at nonroutine work. That is a debatable point, but it does not detract from the fact, as these few examples have shown, that the W.A.A.F. not only has achieved its object of replacing the men, but has made for greater efficiency in the R.A.F.

We may well ask: What is to become of the W.A.A.F. after the war? Will the entire W.A.A.F. be demobilized like the women's services were after the last war, or will women serve alongside the men in the peace-time Royal Air Force? The answers to these questions largely depend on the peace-time strength of the Royal Air Force, which, we may reasonably assume, will not be reduced to any great extent until several years have elapsed after the end of the war with Germany.

After the war we should have sufficient aircraft, but will we have sufficient aircrew and ground personnel in the regular R.A.F. to maintain that force at the required strength? We are not likely to experience any difficulty in holding sufficient aircrew in the Service or in recruiting

aircrew from boys leaving school, but the ground personnel present a more difficult problem. When hostilities cease the natural reaction of the majority of airmen, other than aircrew, will be a desire to return to civilian life, and this desire will be stimulated by the potential opportunities to be offered by civil aviation.

Moreover, owing to the size of the modern aircraft and the complexity of its equipment, the ground organization required to keep aircraft fit for flying is far greater than it was before the war. These facts alone make me of the opinion that difficulty will be encountered in retaining and recruiting sufficient ground personnel to keep the R.A.F. at the required strength.

'If there are insufficient regular ground personnel to maintain a large air force after the war then methods other than voluntary recruiting will have to be adopted to obtain the necessary man-power. Conscription does not provide the complete answer, as conscripts require extensive trade training before they are of any real benefit to the Service and consequently give little return before they are due for discharge. Furthermore, the other Services would have their demands to make on the country's conscriptable man-power resources so that the R.A.F.'s share of them would not be so very great. Conscription does, however, lead to the production of a large trained reservist force readily available in time of crisis.

The answer to this man-power problem may be the employment of women in the Service, not in an auxiliary capacity but as a regular force. The suggestion of the formation of a Women's Royal Air Force naturally appears at first sight to be a revolutionary idea but, as there has been ample proof of the indispensability of women in the Services during this war, the idea is at least worthy of serious thought.

The first consideration is whether or not an air force career would appeal to women. If we were to ask serving members of the W.A.A.F. whether or not such a career appealed to them, the majority would give "no" as their immediate answers. These answers would be prompted by the fact that many of the officers and airwomen have had several exteremely hard years in the Service and are ready for a rest; furthermore, many of them already have careers and other interests to which they wish to return after the war. However, after a short respite, some of them possibly would be only too pleased to return to the fullness of Service life under the less arduous conditions of peace.

The conditions of joining would have to be attractive to encourage the recruitment of the

right type of woman; in the same way as great care has been taken in the selection of men for the R.A.F., so care would have to be taken in the selection of women for the W.R.A.F., bearing in mind the influence they will have on the men. They must be given reasonable chances of promotion and commission and given the opportunity of serving over-A career in the W.R.A.F. must be looked upon as an honourable one and not as just a job for women who cannot find employment elsewhere. Personally, I would be in favour of women in the peace-time Service being given the opportunity of flying in a noncombatant capacity. When we remember that at present there are women pilots in the A.T.A. flying all types of aircraft, air hostesses flying in civil air liners, and W.A.A.F. nursing orderlies flying with the R.A.F., we can then begin to realize that the thought of women flying with the R.A.F. after the war is not such a revolutionary one after all.

Besides helping to solve the potential manpower problem in the Service after the war, the formation of the W.R.A.F. would have the advantage of being a permanent formation that could be readily expanded in the event of war, far quicker than was possible with the W.A.A.F. at the beginning of this war. It would be able to assist with the training of its auxiliary formation, the W.A.A.F., in peace-time and in the event of conscription for women after the war it would be able to provide the necessary organization for dealing with the Air Force's share of the conscripts.

During this war a large amount of time has been spent by senior R.A.F. and W.A.A.F. officers in debating the wisdom of the introduction of certain trades in the W.A.A.F. The introduction of a trade such as flight-mechanic was one that had to be viewed from all angles; the necessity of employing women, the ability of women to perform these duties, and the psychological effect it would have upon the aircrew who were to fly the aircraft that were serviced by women, all had to be considered. If women were employed permanently with the R.A.F. then, in time of war, we would have the knowledge as to the extent of their ability to perform various duties and the men would be accustomed to women performing those duties.

Before this war, many men in civilian life were under the impression that a life in the Service was one of isolation, and I think that the introduction of women's Services has gone a long way in helping to overcome those misapprehensions. During the war, at such functions as dances, whist drives and concert parties

the W.A.A.F. has supplied a most valuable contribution to the social side of R.A.F. stations at home, and though I am unable to quote from experience I should imagine that at overseas stations the W.A.A.F. is helping considerably to keep up morale. There is no reason why they should not continue to do so after the war, and I feel that if there are women serving with the R.A.F. it might even encourage the men to join!

The organization necessary for the administration of the W.R.A.F. is already in existence and large sums of money would not be required to build separate accommodation, as that too is already in existence on many R.A.F. stations. Admittedly it is no more elaborate than that provided for the men, but that should not present any difficulties as the airwomen have never asked for preferential treatment in the past but have cheerfully accepted the same conditions and risks as the average airman, excluding aircrew, serving in this country.

It is not my intention to give details of how the W.R.A.F. should be administered but I do suggest that there should be no bar to a woman leaving the Service to get married even though she has not completed the period of service for which she joined. No doubt many of the women would marry men that they had met in the Service and, in my opinion, that is to be encouraged. If a woman understands the Service her husband is in, then he is likely to be of far more value to the Service than if he was married to a woman who was not "Serviceminded." There should be no difficulty in evolving and introducing a scheme whereby a woman receives a pension when she retires from the Service or, if she gets married before then, she receives a gratuity, in lieu of pension, according to the number of years she has been in the Service.

Undoubtedly there would be much opposition to the suggested formation of the W.R.A.F. but I find it difficult to discover on what grounds its opponents could base their arguments. Naturally, a great deal of careful thought would have to be given to the detailed planning of the organization and administration of the force, but although there are bound to be difficult problems arising out of the planning, none of them would be insoluble.

In the same way as the W.A.A.F. has loyally served this country in the time of its greatest need, so I believe that the Women's Royal Air Force would serve it equally as well in peace. At the end of the war it will be too late to discuss the formation of the W.R.A.F.—the future of the W.A.A.F. must be decided now.

A Machine Minder's Dream

BY NIGEL WALKER

LTHOUGH an ordinary officer never sees the whole scope of the Air Force as it exists to-day, yet in his little sphere he can build for himself an imaginative condition existing in the planetary sections that revolve around himself as a sun. He cannot know what is being planned for the future any more than he can guess what is for breakfast in the following week, but it falls to many of us to dream, or think about, the future of the Service and our own branch of the Service in particular. As a relaxation from the exact science and art of guiding airmen it is often a relief to be able to sit down and spin oneself a yarn about the post-war conditions. This is my relaxation at the moment. I have set out to plan for myself a complete technical service that will keep the pilots and air crew fully equipped with serviceable aircraft. I have not entered any sort of controversy and have tried to enter the field without appearing to discuss the Service as it functions to-day. I hope that I shall give no impressions of what I do not at the moment agree with, but undoubtedly there will be points contrary to established practice, and here I would say that my dream is a dream as a whole and not little snatches of slumber that snatch. as it were, a few passing glimpses of reconstruction.

One thing I can say at the outset of my imaginative drift into the future, and that is that the Air Force is an immense weapon and a gargantuan force that cannot be disintegrated suddenly at the close of the war. In peace-time it will continue to exist, and although the only dividends it pays are intangible protections, yet there is no reason to suppose that it will break with traditions that have been built up during its own lifetime. In my dream, as I am snuggling down with the blankets around my ears. I hear the sound of aircraft and I hear accentuated the sounds of all the mechanical parts that go to turn a physical crew into a vehicle fighting at a distance. The human element is little to the fore, except in courage and determination, when it comes to dealing out death, the automatic ranges of instruments and contrivances are tending to reduce the variable human judgment to a minimum. Flying is by instruments either visual or automatic; navigation is becoming less a matter of making nature yield up its variables and more a problem of increasing the range of human-guided sign-

posts, or rather sign rays; that in its turn is linked with signals and its associated trades. Gunnery is reduced to almost an exact science and so on with any other crew trades. Therefore as I close my eyes I see that the time is drawing near when the mere pilot, the mere aircrew who are trained for duty in the air will not be able to be given enough knowledge in these basic trades as will justify their training and retention on these duties alone during anything except a very short-time career. On the other hand the mechanical engineer, the electrical or wireless engineer, the wizard of navigation and the other specialists who go to make a passage from A to B successful, must spend a considerable time learning the precepts and practices of their trades and yet at the same time they can certainly find the time to learn the airborne side of their work; in fact that should be part of their training even to the extent of becoming skilled in aircraft. I fear that this change in the basis for training will mean that aircrew as they are known now will fall behind its present prestige and only those who are unable to make the grade in one of the more advanced and scientific branches will be designated plain pilot, navigator, and so on. Thus will pass the first few years of an officer's life, alternating on specialist duties and keeping his hand in with the routine of flying until he arrives at the period when, as now, he seeks higher ranks and has to take a part in guiding policy, staff college, and so on. For a fighting force will no longer be able to be guided by those who fly alone and are not fundamentally tradesmen any more than it can be commanded by those who are tradesmen alone and do not understand the practice of

That is one of the twilight dreams that in some manner affect the main features to follow. But it does not entail that all officers are members of aircrews. There is a vast scope for those who are possibly unfit physically to undertake the burden of flying but are indispensable in the efficient running of the maintenance side of the Service. It is about this technical maintenance that the rest of this thesis will deal. I write only about the engineering side because I consider that my own particular line. But it may equally well apply to the signals, armament, and all other component specialists in varying degrees.

MESSAGE OF GREETINGS FROM

Air Vice-Marshal K. Janousek, K.C.B.

Czechoslovak Inspector General

Once again the Festival of Peace is being celebrated amidst the turmoil of total war. For Czechoslovak airmen this is the sixth Christmas season away from their homes and their fifth Christmas which they are spending among their gallant brothers-in-arms of the Royal Air Force with whom they have had the great privilege, throughout the five long years, to serve and to share in their many victories over our common enemy.

It is my fervent wish that the next Christmas may be spent in much happier circumstances by all.

The year just past has been one of gigantic effort on the part of the Armed Forces of the United Nations to destroy the German armies and to bring about the final liberation of Europe. May I express the hope that 1945 will bring for the Allies a speedy victory, the establishment of a lasting peace, and the return of tranquility to the peoples of the United Nations.





MESSAGE OF GREETINGS FROM

Vice-Admiral J. W. Termijtelen

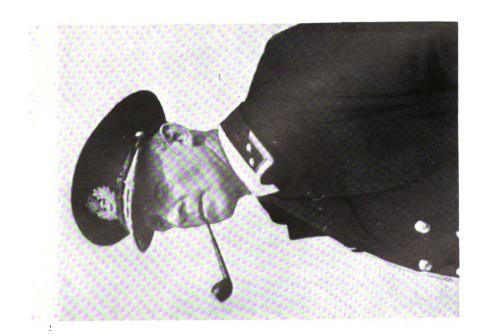
Director of Netherlands Air Forces

I gladly take this opportunity of conveying my heartfelt thanks to the Royal Air Force, and all those serving with it, for the cordial hospitality extended to all Dutch airmen during these years of close co-operation with their British comrades in this country and other parts of the world.

A well-known proverb says "Good wine needs no bush," but nevertheless I wish to emphasize my admiration for the splendid organization of the R.A.F. and the great courage, determination and endurance displayed by its officers and men.

All occupied and ex-occupied Europe knows the three famous letters R.A.F.; they have won undying fame. The Battle of Britain will always be remembered as the first check to the enemy and the turn of the tide of war.

This Christmas, after more than five years of war, we can discern the end of the struggle in Europe, for which we all long so fervently. Let us see to it that all the brave young men of the R.A.F. did not die in vain and that the bonds between the R.A.F. and the Allied Air Forces remain as strong in the future as they were during the grim but glorious days of this epic fight against the powers of darkness and evil.



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THE PROBLEM

The problem is how to produce at the requisite moments over any number of days in the year a given quantity of aircraft of a type, and for a purpose, that has been ordained by a planning staff. I think everyone has some ideas as to how aircraft come into being; partially by skill of firms of designers and builders and partially by promptings or specifications by the staff officers who are guided by experience and foresight. The building of aircraft by constructional firms is undoubtedly good practice and the guiding hand that adds the operational parts and moves a piece from here to there ensures that each morsel cannot be blamed on to the designer in all fairness. Then there are the times of teething, of trials and tribulations, of seeking after improvements to negative the faults that the open air has laid bare, until the time comes for the chosen tool to start rolling off production. Then it starts looming up into my conception of the problem; from this time until it is finally cast aside as beyond any further use it becomes the heart and body of the problem to be tackled by a portion of the Royal Air Force. During this life it will be on many airfields and it will undergo many stresses when the scars may be frequent and the renovations exacting, but the whole concern should be the responsibility of the technical branch.

The problem resolves itself into a feat of having enough men and machines in the right places to keep the flow of work steady and the financial side as economically favourable to the nation as possible. In considering this problem there are those aspects which bear a definite affinity one to the other but which can be separated for the purpose of discussion. Their relationship is to a major extent clear so that each one can be divided into a class which should naturally not be watertight, yet has its own class distinctions, and with their peculiarities naturally the problems have separate solutions. In a few words the three classes are firstly experimental and trial; secondly, the support of the field force, and, thirdly, the resuscitation of used goods. The scope of each of these classes has been left as wide as possible on purpose because it is easier to define a mass than a specific point. Therefore, if I may define the trinity of problems, each one under its own heading, I will say of the first that with the safety of the State in possible jeopardy as the result of a wrong decision on the material side, it is essential that all major components are tested and improved until each one becomes thoroughly trustworthy and capable of a big future for improvement and scope. Not only will this apply to aircraft structures and airborne equipment, but also to the ancillaries that go to make life less burdensome for the ground crew and more extensive for the aircraft. This problem is one that can be discussed ad nauseum on paper from a technical aspect and it is so bound up with higher policy and political or territorial conditions that when it is discussed later it will be found that only a few bare bones are displayed for covering.

The second class is really the existence of the R.A.F. before the war in its fundamentals; the field force refers, of course, to the air field and, being interpreted, means all those aircraft actually in use in units where active operations or flying are taking place. In this category come all the day-to-day problems of inspections and repairs that will be necessary to keep each unit fighting fit. While the third class will be the static organization to which work is sent for a new lease of life. Its major function will be the economical prolongation of value in all the multitudinous range of equipment that is used by the units at field stations. None of these three is linked by anything except a two-way line of give and take, yet that line must be kept intact and flowing, otherwise one end of it will become waterlogged—or air-logged—and float around as flotsam gradually using up its own substance.

RESOLUTION INTO PARTS

In problems and in theories where a complex state exists it is often easier to deal with it by dividing the whole into parts and, after taking each part and considering its implications, knit these parts together as a complete mass. In this case I propose to divide the problem that was propounded in the previous paragraphs into the animate and inanimate sides, the animate and living side to consist of personnel and the inanimate to comprise the sticks and stones and so on that go to make modern working shops and sheds and their contents. While it is not possible to contemplate one of these divisions without the other, there are bound to be paragraphs and even sentences where the inevitable connections are displayed. In fact they are no more clearly displayed than in the experimental and proving section of the force. This is visualized as being a proving ground of all equipment and a section where plans are laid for future improvements. It is here that those skilled in the operation of aircraft, both in the air and on the ground, congregate for the purpose not only of improving designs and so on but also for making them

successful in reality. The cost of such a faction is inevitably large, due to losses and pipe dreams that fail, and therefore to eke out the bare pittance that is allowed for this work there must be a commercialism in the products. The business brains must be evident, not in paring the money but in directing the by-products that are not the sole perquisite of Mars. In this way it will be possible to make specialists go ahead and to attract the more brilliant inventors and improvers. The system of patenting using the Government department and the scientist concerned would be developed and the results of certain of the less secret developments would compete in the world market for buyers. Those who worked in this section would be allowed periods of study in outside conditions and would have to have special coaching before and during their sojourn, so that they could keep in touch with the particular conditions in the Service outside. This subject in its more material details is one of vast and specialized components which are outside any scope here.

So to turn to the next portion, that of field work; it is idle, I think, to suppose that pilots and aircrew are going to be given aircraft as though they were brought each day out of a secret place and returned to that place at the end of its immediate use. But it is not, I also think, idle to suppose that the men that fly in the machines will be taught one of the trades that go to look after the aircraft, and so it comes about that the chief in each unit besides being skilled in flying is also knowledgeable in their internals and can co-ordinate and guide the total labours of all under him. These minions cannot all fly or be flown, nor would it be desirable if they could, for some units would thereby become unbalanced in one excess or the other. By having men who are trained for the airborne equipment and understand it thoroughly from A to Z will add a finishing touch to the care that goes into keeping it in trim. The counter-balance of all these technicians is to have ground crews who are also trained as fitters and mechanics of their various trades and grades to do the spade and routine work in the hangars and in the workshops, while the aircrew who have no other trades are taught the additional routine offices of adjutant, training, aircrew leaders, and so on. There will be some periods in every aircrew career when the officer concerned will be primarily in the hangars and there will be other stations where the hangars will be in the care of officers with no aircrew pretensions because there are many very capable specialists who could not, or would not, consider the addition of flying to other duties. By hangar and workshop jobs I mean the preparation of the aircraft and accessories and the servicing to keep them fully operational. The sum of all these airfields would be the active Air Force and would be available for duty wherever the Air Council decreed. It would naturally have all the traditions of the Royal Air Force for they are inseparable from the flying units and they would carry on faithfully the present functions of defence.

Now there remains the third section, the static repair shops, the depots manned by the Group I tradesmen who are there to instil new life into part-worn and damaged equipment. I visualize these as bases around England where aircraft and all their components, accessories and their ancillaries, in fact everything that keeps the Air Force operational will come for repair. Here the problems will be different in some degree from the field force because with static bases the man-power can be drawn from people who live or who are willing to live in the district. The workmen can be given jobs there, knowing that they will remain there for a length of time to be agreed mutually. The hazards and separations of station life are not there. Similarly, the officers who plan and man the bases will have to be on a different basis from the field force; these officers must be skilled in industrial planning and capable of running the shops on fully economical lines with corresponding results. Each base will be to a certain extent self-supporting, apart from spare parts which must come from manufacturers. The C.O. will be allowed more power to keep his base equipped. In place of an accountant officer he will have an auditor whose business it will be to scrutinize the purchases; he will have an annual board to assess the conditions of work turned out in the manner of an annual review. His juniors will be trained in various jobs and his local committee will be empowered to decide such local problems as establishments and building within limits. I think that decentralization on certain points like this will be essential and decisions taken will have to be judged on results. As a result, there will probably be a change in appointments to positions; in this sphere volunteers, or candidates, will be called for to fill each vacancy as it is about to fall vacant. The applications will be carefully sifted and the last few applicants interviewed by a board who will appoint the successor. In this way there will be an incentive to work and a choice of the path one wants to take, and I consider that although ranks will be held by officers these are not sufficiently classified for these jobs and therefore each appointment will carry a certain salary within the rank, which will vary with responsibility. The call for applicants for each appointment can then make the condition attached to it clear, and with a few simple regulations covering appointment to higher rank, the filling of vacancies should be by merit and choice. This, so far, has applied to officers, but I think the same will apply to the remainder of the tradesmen in the bases; their choice will be free and their terms of service by a rather more flexible contract than is now offered to an airman. There is no reason why this system cannot be continued overseas for the various air forces operating there, using both local labour and volunteers from England.

CONDITIONS OF SERVICE

In discussing conditions of service there is one fact that runs like a strong thread through all plans; it is that in Government service some sort of guarantee must be given as to the length of service involved. This contract, once made, must be kept and not broken, except for dire reasons. The result of this is that no one can be far-sighted enough to visualize conditions more than one or two years ahead. Therefore a permanent nucleus only can be kept up to a certain figure and all the remainder to make up for temporary conditions are given limited time employment. In a number of Service employments the conditions of service are against re-employment in civil life, especially for officers whose sole qualifications are often soldiering or flying with little civilian counterpart; therefore one must bear in mind the attraction to be offered if the job has a recognized civilian standing.

With this in mind one can start talking about the men who will man both the field force and the bases. If they are to be there for a number of years it is worth training them thoroughly and encouraging them to be in the Service during the most active years of their life; therefore, by offering excellent training conditions and prospects one can choose candidates. comparatively young men can be trained for either force and will have to be educated to a recognized commercial standing before starting work; then for those in the field force there is experience and a good ticket for a job or there is the chance of settling down in a base workshop for a further period. In the base workshop the employment will correspond to commercial experience, and at the end of a contract an airman may leave or continue as he

likes. For officers the conditions of training would be more stringent and the entry more selective. As already mentioned, the field force would have a number of engineer-pilots and engineer ground officers who would be thoroughly grounded in aircraft engineering, either having passed through a R.A.F. Engineering College as a cadet for three or more years or, having graduated outside, passed through a thorough conversion course. For the officers of the base workshops the training will be to a certain extent the same, but with a closer attention to specialization and a grounding in the special problems involved in this type of work.

Then for the officers who make up the strength by short-term employment in both sections; a number will advantageously be promoted from the ranks, but theirs will only be a short prolongation of service unless they show exceptional zeal, for I feel that under conditions of universal prospect of entry by talent in the first place the majority of men in the ranks will not be up to the required standard. The remainder will be those who are keen to serve a period to gain experience on aircraft work either because they intend to carry on later or that they are taking it from a financial angle. Finally, in these conditions of service I will mention the experimental section and staff officers. Both these officers should be specialized in their particular lines and therefore must have a period of preparation before taking up their jobs; before being posted to an appointment they must have a free period of several months to study the outside details and implications of their job. Both these employments are highly specialized and only by concentrating down to the final details before taking office can one be certain of doing it full justice.

Staff officers in the field force will fall into two classes, one of whom will be the liaison with the operational staffs and the other will be purely technical. The former are, of course, situated in the entourage of the Commander. but the latter should be actually at a station where equipment is in use. Physical contact will help to solve technical troubles more easily than searching in books when paper work is involved, therefore technical staff will have his office at the biggest station where his particular line is in use. In the base force the problem may be varied but the technical solutions remain basically the same, and in addition there will be extra staff duties requiring training such as inspecting, control of man-power and so on. But the main fact is still there, the specialized training for a staff appointment must be before the occupation of the appointment and not after.

ANCILLARY FOLK

If the technical services of the R.A.F. are going to form a goodly proportion of the whole service then there will be sundry ancillary services which must grow up alongside with a common aim if not a single control. Already I have mentioned such professions as auditors, and I think that I had better start at the beginning with that essential service, the store. In every sphere there is a need for a store, and never more so where technical works are concerned; the sound knowledge and judgment of a good technical store staff is inestimable. Apart from merely dealing for the most part in paper transactions and equipment with or without exotic names but otherwise untraceable when built, the store-keeping branch would be entrusted with the physical side of purchasing, the vetting of samples and the selection of contracts from a value-for-money viewpoint. When a Service has to be supplied at aerodromes where units may move at any time, a common supply and equally easy replacement system is imperative, and it is often financially unsound to allow each unit freedom of purchase in the smaller and more common articles in everyday use. But with static bases it will be preferable to allow a good measure of freedom to the local equipment staff to acquire the parts that are considered to be the best fitted to the job, remembering always that a critical survey and summing-up approaches each year when too lavish spending without corresponding results is answerable with loss of position. I do not think that it is possible to combine these two functions of buyer and dispenser with one of accountant, but this is equally important, as are the trades associated with building and maintenance of workshops. These latter again play a bigger part in the bases and here I think that a point can be made that decentralization is desirable, for it is probably easier for a man on the spot to make decisions and put up plans than for plans to be produced tentatively and sent down to the spot. This sounds as though it infers a complete section of planners in every trade on every spot, but in actual fact it does not. Travelling specialists should be wherever work is to be done, to obtain first-hand information from an experienced officer who knows how each article or building will be used. This sounds easy to follow but very often its simple doctrine is neglected shamefully. One cannot visualize in a theme of this size the other varied branches of mankind's intelligence that will go to make the lot of specialist tradesmen not so much easy as fruitful.

ORDER

I have headed this sub-section "Order" and not "Discipline," for I feel that ideas on discipline in a force of this sort are bound to take on a new outlook. Under "Order" I include such things as promotion, education, pure discipline, and so on. Promotion in itself in a Government occupation is relatively a matter of time from one step to another. The gentle art of self-advertisement by displaying one's credentials and one's increased capacity is neglected; the old school rule of "don't speak until you are asked" should be put aside, and if promotion examinations are to be held let the onus of attempting them be at the choice of the individual and let the examinations in the higher subjects, as staff college, be extended over a few months to avoid the bane of mechanical learning. I would have the system of applying for positions and locations improved and extended as far as it can be, for nothing extends a man's ambition and capabilities if he has not only to quote but to prove himself to achieve his selection. This leads to education which has already received a note under training, but here I refer to the increasing value of night classes and other forms of post-apprentice training. Here again it is the ambition of the applicant that counts, and while it is impossible to provide in every community the total facilities necessary for instruction, yet at the bases, for instance, there will be night schools and advanced technical courses always available which can be extended to include Service personnel who will then return better qualified to battle up the path of promotion. Finally, discipline, which is a thorny and perilous subject to attempt in brevity, but, as I have already said, the methods are constantly changing and the relics of armies must fade soon for peacetime employment and more rational ideas of monetary fines, or useful work will wholly oust the prisoner idea for purely Service offences, and the power to stop employment or promotion will be used in stubborn or aggravated cases more freely and without the timehonoured palaver of a formal court-martial. A Service magistrate with a technical upbringing will be the counterpart of justice in civilian courts with subsequent appeals if necessary. But I see no reason why the senior officer should not continue to be given this authority.

FINALE

Dreams! You say that dreams are expensive in war-time. But no, I say; in the evening, as a relaxation, I dream. I ponder on the future and I hope to see the Flying Service, that relies

so entirely on its machines, with a well-conceived staff to keep them in concert pitch. I see, maybe hazily, a writing on the wall that questions risking the long training lives of those that fly by short training those who prepare before flight. Maybe, I say to myself, I am going over ground that has been ploughed, sown, reaped and put away in a file, but still I dream until I feel I must share it with someone else, though it be kicked and harrowed until it becomes but part of the farmyard junk.

And so the dreams fade, leaving only the outlines still remaining of the growing importance of technical gentlemen, who will learn the ways of the air as well as of the ground, of the mechanics who build again the remnants and those who take to heart the need for experiment. I imagine the magic-eye method of sending a man to a job, giving a bit of ground to

allow those who fancy it to parade themselves and their wares until, cap in hand, they ask for it. Then, having established a bridgehead of confidence, being given special training before taking it over. I fancy a little less begging for concessions among those who sway the destinies in the higher appointments, resulting in a local labour control and a partial local equipment control. Until finally I hope for a considered check of industry to account to a taskmaster government the toils of a good or a bad servant, so that My Lords can choose the one or reject the other with justice. One can dream of lordly shops and well-laid-down stations, but each point in each design is but a brick in the whole building, and that of little worth if the foundations are ghostly, built on time basis instead of a material construction. And now my little mite of a dream receives its baptism.

The Winning Essay of a £500 Prize Competition

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By LIEUTENANT G. H. D. GREENE, Oflag VII B

THE basis of all post-war reconstruction must be a stable peace; and this itself is impossible without mutual regard between those now fighting as enemies.

I remember how, during a visit of German ex-soldiers to London as guests of the British Legion in September, 1938, an unsympathetic acquaintance remarked to me that the imminence of war made this comradeship look silly. In reality it was war that was made to look silly by the fact of that comradeship.

That such efforts for goodwill had no obvious success last time should not discourage the Legion from acting thus again—indeed, on a

larger scale.

The stimulation of chivalrous instincts among those most able and likely to feel them and most desiring to influence the conduct of affairs should help to abolish quickly any injustice of the peace settlement; and no settlement, however just, will be readily accepted unless its demands for wide international cooperation clearly come from men generous enough to respect without prejudice the simple

essentials of personal courage and patriotic devotion.

Moreover, such respect, fostered by intercourse, may in time ripen to a friendly understanding which will not only preclude future disputes but disseminate the arts and riches of peace. I express this not as a pious hope but as a practicable and necessary aim.

What can be done between enemies can be done between friends. We can learn much from individual contact with the French and Americans, for example and, above all, with the overseas British.

An excellent task for the Legion (and one which the Government might well aid financially) would be to organize visits of ex-Service men from Britain to the Dominions.

Australia and Canada are under-populated; Britain is overcrowded. The war has given many, who previously were disheartened by misfortune, a consciousness of manhood and a taste for action. Let these (the more the better) travel, observe, report; and migration will follow.

Nor is antipathy between native and immigrant likely to flourish where each has experienced the qualities of the other during the common effort, and perhaps revived and deepened understanding through still more recent hospitality.

Now for Britain itself.

The war has produced so much evil that to ignore any incidental good would be criminal.

Good has, indeed, shown itself, not only in the social legislation of the State but in the active relationship of groups and individuals.

It is improbable, and would be wrong, that legislation which lays the heaviest burdens on the broadest shoulders should be greatly modified for the work of reconstruction; but social justice and equality will accomplish far less (and would not, I believe, long endure) unless inspired by the sense of fellowship which is, perhaps, the best thing of all that the war has produced.

This sense, general as it is, is strongest in the fighting Services, to whose young and numerous members most of the important tasks in peace also will fall; and if they can retain their high purpose of joint endeavour, there is no plan beyond the country's power to carry out. But even the most willing spirit can be discouraged and alienated by indifference; and it is up to the nation to remember with gratitude its past defenders and present workers.

For this the Legion would act as intermediary, especially where legislation and Trade Union action would not normally reach: in assisting, for instance, the choice and obtainment of jobs on demobilization (especially for those partially disabled) and providing information should a later change be desired; in advice on emigration; in locating former comrades and friends made abroad; in care for the dependents of war-dead and equally of those who gave their best years to their country and died soon afterwards; in exerting local influence to secure, say, the use of a playing-field or the services of a scholar or traveller for evening classes or talks; in acquainting M.Ps. and local authorities with the ex-Service man's point of view and impressing on them opportunities and needs—in short, in variously benefiting the ex-Service man, in reminding nation and individuals of his importance and their duty to him, and in thus indirectly keeping before him in turn his still existing duty to a community worthy to command it.

The man for whose very feet an officer holding the King's Commission has shown concern, deserves, at least, when he is no more required to march, that all ranks of civil society should feel an interest in his life's work and

happiness.

If this interest is not felt, reconstruction will be impossible. If it is felt and demonstrated and acted on, the comradeship of war will be continued in a greater comradeship of peace.

First, then, the establishment of international

goodwill and confidence is essential.

Secondly, an immense effort will be demanded of the united nation for reconstruction, which, guided by a common social conscience, will aim at the abolition of poverty, unemployment, disease and other pre-war evils—symbolized probably on the national side by huge enterprises of house-building and public works. Still, these are only means.

The true ends of life are of that order of which (the late) Archbishop Temple cites as examples: "Religion, art, science and, above

all, happy human relationships."

Yet even human relationships are worth little, and are seldom happy, where there is no coherence of purpose. Our community will certainly be a happy one while we are together putting our reconstruction plans into operation; but we cannot go on building houses and schools and swimming baths for ever.

I believe that the answer lies in education—not only for children (a higher school-leaving age is indeed vitally important) but for adults, whose progressively increasing leisure will make the fuller exercise of faculties both possible and necessary. We shall not have abolished unemployment merely in order to lounge out our existence weary of the world we have created.

All the wisdom of the wise will be needed to guide our lives to their proper ends; and all our powers and resolution, to follow.

[Other prize-winning essays will be published in the R.A.F. QUARTERLY later.]

Battle of Britain Sunday

BISHOP OF SOUTHWARK'S SERMON AT THE GREAT ABBEY SERVICE

N Sunday, 17th September, a service of commemoration and thanksgiving for the victory won in the Battle of Britain was held at Westminster Abbey. It was attended by Cabinet Ministers and many other prominent personalities.

The following is the text of the sermon preached by the Bishop of Southwark, the Rt.

Rev. B. L. Simpson, D.D.:—

Judges V, 18, Zebulun and Naphtali were a people that jeoparded their lives upon the

high places of the field.

My text comes from the 'Song of Deborah' which is probably the oldest poem surviving in the world. It was composed some 3,000 years ago to commemorate a mighty deliverance of the Israelites from a very powerful oppressor. It is a magnificent bit of literature still throbbing with life, full of gratitude, scorn and irony.

'If we were to-day celebrating final victory it would be delightful to run through this song in detail, so often do its ancient words find an echo in our modern situation. There is a lament over disarmament . . . 'Was there a shield or spear seen among 40,000 in Israel? ' 'The highways were deserted and the travellers passed through byeways'... I have thought of that so often when driving a car through a solitary London road which ought to have been a mass of traffic. The enemy had invented new armour -900 chariots of iron, a primitive anticipation of tanks. And for a peace celebration what could be finer than his opening and closing words—'For that the leaders took the lead in Israel; for that the people freely offered themselves . . . Bless ye Jehovah . . . So let all thine enemies perish, O Lord! and the land had rest for 40 years . . . which may God grant us in his mercy.'

"As the poet looked round on the various tribes who had been summoned to save the dawning national life, he lashed out at some who had stood aside: "Curse ye, Meroz," said the angel of the Lord; "curse ye bitterly the inhabiters thereof, for they came not to the help of the Lord, against the mighty."' For others he had words of praise, and he singles out two tribes for very special mention: 'Zebulun and Napthali were people that jeoparded their lives upon the high places of the

field.'

"When our peace celebration comes we shall make no such distinction, nor attempt to apportion praise to forces on sea, land or air. But we

are not to-day celebrating a final victory but one special action which rendered it possible, for we are concerned only with the battle fought out in the high places over Britain in September, 1940. Here in the ancient Abbey so closely interlocked with our national life for a thousand years, we are assembled on another September afternoon to express our gratitude and the greatness of our debt to those who saved

the nation four years ago.

"I, who am privileged to be the spokesman of that gratitude, have no claim beyond being in London all the way through and having a Diocese which has suffered more than most through the last visitation. I have also been carried out by the Air Force to the Italian line, and have with pride watched their complete dominance of the air on that front. All I can do to-day, with no special knowledge and no technical skill, is to answer three questions on behalf of my fellow Londoners. First, what do we owe? Secondly, to whom do we owe it, and, thirdly, how can we repay?

WHAT IS OUR DEBT?

"In the first place, what is our debt? We realize it now. I wonder how many ordinary citizens realized it in 1940, though we knew the situation to be grave enough. After a winter of otiose war which gave us a completely wrong conception, we had watched the enemy hurl his mighty army and the great unparalleled air force which he had built up for the domination of Europe in Norway and Denmark, Holland, Belgium and Luxembourg, and then turned against France and our own expeditionary force. We had seen France overrun and vanquished in the course of a few weeks—France which was to be our great military standby on land until such time as we could build up an adequate army-and we had brought back our own troops from Dunkirk, leaving behind all the equipment so laboriously supplied. We were in a position worse than we had ever faced in the last war, with an all-conquering foe in possession of the channel ports ready to turn the power of his mighty land and air machine on to his chief adversary. How he would have fared with our Navy I do not know, but his first requisite was to smash the comparatively small beginnings of the great air force which we needed time to develop, and that he set out to do in September, 1940. That force was in its childhood, but its quality was beyond ques-

tion, and in the course of several weeks it had completely broken the power of the attack, saved us from invasion, given us a respite in which to gather strength, and sent the enemy on his eastern venture which was to prove his ultimate undoing. If that battle in the high places had not been won, one shudders to think of what would be our position to-day. That was the beginning of our debt; but it has grown through the intervening years, through those long months of the winter of 1940 to 1941, when it saved London from utter destruction, and again in the last three months against the flying bomb, at a cost of 3,000 young lives; in the wrecking of the enemy's power to fight, in the support of all our armies and our searoutes, and in rendering possible the invasion of Normandy and the final phases of the war. It is all summed up in the Prime Minister's pregnant phrase which should last as long as English history: 'So much owed.'

To Whom do We Owe It?

"My second question is: To whom do we owe it? May we start with God, without any suggestion of some supernatural intervention, but working through the channels of the human spirit? 'For that the leaders took the lead in Israel . . . for that the people freely offered themselves . . . Bless ye the Lord.' May we dwell upon those leaders, the administration which planned strategy and tactics in a comparatively new medium, and the inventors who gave brains for the production of aircraft and the labour which provided the skill for their manufacture? But none of these would grudge us giving pride of place to the young men who jeoparded their lives in the high places. Young men of character and courage, skill and education and nerve, tumbling over each other in their eagerness to enter a Service in which the risk must be enormously high. We older men can only stand and wonder and ask 'Why?' and, looking back to a forgotten youth, try to discover the motive of this keenness. Patriotism and surrender of the self to the community? They would grin if we said it, but we knew that something of it must be there; a form of combat which comes nearest perhaps to the chivalrous fighting of old days in the beastliness of modern war? Proof of skill in the management of a wonderful engine of combat: the call of adventure and the pull of idealism however disguised? Stress what you will, but let us stand and pay tribute to a quality of life and character in our nation's manhood to which we others to-day owe our freedom and often life itself.

How Shall WE REPAY?

"And lastly, how shall we repay? By this annual service, by our personal appreciation, by the fullest possible scope extended to them in their future careers, by infinite care that the new chance of national life which they have won for us shall not be thrown away again by any carelessness or indifference. Yes, of course, by all these. We are all so anxious and so forewarned of the risks of forgetfulness and inertia that I would like to take these for granted. But there is another repayment for which I want to plead in closing—it is the creation of a condition here in England which shall never again waste the splendid qualities of our young manhood which war has evoked; that with the return to peace and stability we shall not again condemn our youth to frustration, to mediocrity and to an impotence to be at its best; that even in peace there shall be the High Places in our national life; we still have to work out what we were talking about in 1914 to 1918—a moral equivalent to war.

"And for that we have to create the right public opinion; the honouring of the right things, the appreciation of the right values, a national orientation to quality of life. For if everyone acts as though financial success or a good time or glamour or sex or easy security were the main end of life, how can young manhood, having these things dinned into its ears, hear the call of adventure and service? But if our whole educational system and each personal life creates an atmosphere of honour round the high places, youth will want those high places even in peace, and will gladly accept the burdens which are linked with honour. That was what Plato tried to persuade us 2,000 years ago, and what Hitler has proved to be still true, though he harnessed it, alas, to the wrong values. Have we learned our lesson? That pride and complacency, cynicism, disillusionment, slackness and unfaith are the deadly sins, and that what matters to a nation is its sense of values and a living faith in them? And that is what I and a million other 'I's' are creating every day. If we fail them there, we have not begun to repay our debt.

"If I seem to have said little about God in an Abbey sermon, I hope you will understand that He is implicit throughout, as we think of Him as mainly concerned with this quality of

"For that the leaders took the lead in Israel; for that the people freely offered themselves, Bless ye the Lord.

"Zebulun and Naphtali were peoples who jeoparded their lives on the high places of the field. Bless ye the Lord."

On Winning the Peace

The Planners

To-day we plan to-morrow's fight;
And all that man can do is done:
The die is cast, for wrong or right:
And time slips past. We wait the gun.

By midnight oil as incense burned
In hours of toil, we humbly pray
That nothing breaks, that we have learned
From our mistakes of yesterday:

That all has been foreseen, forethought:
Forethought, foreseen, each circumstance:
Providing all and leaving naught
At beck and call of wayward chance.'

To you the fame if all goes well; To us the blame for aught awry Through faulty plan: to us our hell Should any man untimely die.

R. R.

Information

In a leader under the title of "The Good Citizen" The Times Educational Supplement referred to the crucial importance of the development of popular education for citizenship. "It is in this field that the richest opportunities await exploitation. . . . During the war a new sense of awareness, a more rational and critical attitude, has been born in this vast population. Many diverse causes have assisted at this birth, but outstanding in range, clear perception of purpose, and results is the development of facilities for informal adult education in H.M. Forces. Millions of young men and women, children in mind even more than in body when they entered the Services, have been awakened to some realization at least of the responsibilities, duties and privileges of democratic citizenship. The main instruments which have contributed to this awakening are the discussion group and the "News Room"; and these should be used to build the bridge between adult education in the Forces and adult education in civil life. If every local education authority in the country would secure in every town and village no more than two large rooms —one for discussion and display of news, and one for the necessary canteen—and would allocate a modest sum of money for their equipment and maintenance, the bridge could be built. It could best, and would if the opportunity offered, be built by ex-Service men and women themselves; they know the technique, and the approach to those they would induce to use the clubs."

Individual World Citizens

"What is perfectly clear in my mind is that this sense of community, this reawakened awareness of us all belonging to each other in an interdependence of simple understanding and ordinary kindness—is the thing that matters. I don't know what sort of international action you can take about it. I can't think that forming pious societies, with a nice book of rules and local committees and occasional tea parties, will help very much. The challenge now is to the individual, and the warning is all against the mass movement, with its flags and goose-stepping and hallucinations of power and importance."—George Blake in a broadcast to B.B.C. overseas listeners.

An Educated Man

"... Freedom is not an easy way of life. It is workable only in a society which enjoys economic health, but equally it is workable only in a society which has trained itself to think.... I think we are getting in sight of the ideal that in some way and at some time every student, whether as schoolboy, undergraduate, or post-graduate should spend enough time in a foreign country to be at home in its social and political life—to understand how its people think. . . . I want to see the creation of at least one international university, founded and financed by the United Nations for the common good. It should devote itself chiefly, if not entirely, to the studies and sciences that have a bearing on the art of living together in society—psychology, economics, history, law, anthropology, ethics. Teachers and students alike should be drawn from all the races of mankind. Two aims should guide such a university. In the first place, it would focus our thinking about this difficult adventure of living together. Out of it might emerge a living international faith. Secondly, I think we might train here, as we could train it nowhere else, the international civil service of the future. Men and women who study and play together in their youth will find it easy in middle-life to work together.—Dr. H. N. Brailsford, broadcasting in the B.B.C.'s Pacific Service.

Planning for Peace and Security

TENTATIVE PROPOSALS FROM DUMBARTON OAKS

THE report of the British delegation to the conversations at Dumbarton Oaks, Washington, between 21st August and 7th October, with the delegations of the United States, Russia and China on the maintenance of peace and security after the war is taken from The Times of 10th October. Agreement was reached on a wide range of subjects, and tentative proposals have been made for the establishment of a general international organization under the title of The United Nations.

The proposals, which are set out in full below, deal with the purposes, principles and membership of the organization, its principal organs, including a General Assembly, a Security Council, and an International Court of Justice; the composition, functions, and powers of the General Assembly and of the Security Council; arrangements for the maintenance of international peace and security; international economic and social co-operation; and transitional arrangements.

The British, United States, Russian and Chinese Governments have agreed that after further study of the tentative proposals now published they will as soon as possible take the necessary steps with a view to the preparation of complete proposals which could then serve as a basis of discussion at a full conference of the United Nations.

The full report of the tentative proposals is as follows:—

There should be established an international organization under the title of The United Nations, the Charter of which should contain provisions necessary to give effect to the proposals which follow:—

CHAPTER I—PURPOSES

The purposes of the organization should be:

(1) To maintain international peace and security, and to that end to take effective collective measures for the prevention and removal of threats to the peace and the suppression of acts of aggression or other breaches of the peace, and to bring about by peaceful means the adjustment or settlement of international disputes which may lead to a breach of the peace; (2) to develop friendly relations among nations and to take other appropriate measures to strengthen universal peace; (3) to achieve international co-operation in the solution of in-

ternational economic, social and other humanitarian problems; and (4) to afford a centre for harmonizing the actions of nations in the achievement of these common ends.

CHAPTER II—PRINCIPLES

In pursuit of the purposes mentioned in Chapter I the organization and its members should act in accordance with the following principles:—

(1) The organization is based on the principle of the sovereign equality of all peace-

loving States.

- (2) All members of the organization undertake, in order to ensure to all of them the rights and benefits resulting from membership in the organization, to fulfil the obligations assumed by them in accordance with the Charter.
- (3) All members of the organization shall settle their disputes by peaceful means in such a manner that international peace and security are not endangered.
- (4) All members of the organization shall refrain in their international relations from the threat or use of force in any manner inconsistent with the purposes of the organization.
- (5) All members of the organization shall give every assistance to the organization in any action undertaken by it in accordance with the provisions of the Charter.
- (6) All members of the organization shall refrain from giving any assistance to any State against which preventive or enforcement action is being undertaken by the organization.

The organization should ensure that States not members of the organization act in accordance with these principles so far as may be necessary for the maintenance of international peace and security.

CHAPTER III—MEMBERSHIP

Membership of the organization should be open to all peace-loving States.

CHAPTER IV-PRINCIPAL ORGANS

- (1) The organization should have as its principal organs: (a) A General Assembly; (b) A Security Council; (c) An International Court of Justice; and (d) A Secretariat.
- (2) The organization should have such subsidiary agencies as may be found necessary.



CHAPTER V—THE GENERAL ASSEMBLY (A) COMPOSITION

All members of the organization should be members of the General Assembly and should have a number of representatives to be specified in the Charter.

(B) Functions and Powers

- (1) The General Assembly should have the right to consider the general principles of cooperation in the maintenance of international peace and security, including the principles governing disarmament and the regulation of armaments; to discuss any questions relating to the maintenance of international peace and security brought before it by any member or members of the organization or by the Security Council; and to make recommendations with regard to any such principles or questions. Any such questions on which action is necessary should be referred to the Security Council by the General Assembly either before or after discussion. The General Assembly should not on its own initiative make recommendations on any matter relating to the maintenance of international peace and security which is being dealt with by the Security Council.
- (2) The General Assembly should be empowered to admit new members to the organization upon the recommendation of the Security Council.
- (3) The General Assembly should, on the recommendations of the Security Council, be empowered to suspend from the exercise of any rights or privileges of membership any member of the organization against which preventive or enforcement action shall have been taken by the Security Council. The exercise of the rights and privileges thus suspended may be restored by the decision of the Security Council. The General Assembly should be empowered on the recommendation of the Security Council to expel from the organization any member of the organization which persistently violates the principles contained in the Charter.

(4) The General Assembly should elect the non-permanent members of the Security Council and the members of the Economic and Social Council provided for in Chapter IX. It should be empowered to elect, on the recommendation of the Security Council, the secretary-general of the organization. It should perform such functions in relation to the election of the Judges of the International Court of Justice as may be conferred upon it by the Statute of the Court.

(5) The General Assembly should apportion the expenses among the members of the organi-

zation, and should be empowered to approve the budgets of the organization.

(6) The General Assembly should initiate studies and make recommendations for the purpose of promoting international co-operation in political, economic and social fields and of adjusting situations likely to impair the general welfare.

- (7) The General Assembly should make recommendations for the co-ordination of the policies of international economic, social and other specialized agencies brought into relation with the organization in accordance with agreements between such agencies and the organization.
- (8) The General Assembly should receive and consider annual and special reports from the Security Council and reports from other bodies of the organization.

(C) VOTING

(1) Each member of the organization should have one vote in the General Assembly.

(2) Important decisions of the General Assembly, including recommendations with respect to the maintenance of international peace and security; the election of members of the Security Council; the election of members of the Economic and Social Council; the admission of members, suspension of exercise of the rights and privileges of members, and the expulsion of members; and budgetary questions should be made by a two-thirds majority of those present and voting. On other questions, including the determination of additional categories of questions to be decided by a two-thirds majority, the decisions of the General Assembly should be made by a simple majority vote.

(D) PROCEDURE

(1) The General Assembly should meet in regular annual sessions and in such special sessions as occasion may require.

(2) The General Assembly should adopt its own rules of procedure and elect its president

for each session.

(3) The General Assembly should be empowered to set up such bodies and agencies as it may deem necessary for the performance of its functions.

CHAPTER VI-THE SECURITY COUNCIL

(A) Composition

The Security Council should consist of one representative of each of eleven members of the organization. Representatives of the United States, the United Kingdom of Great Britain and Northern Ireland, the Union of Soviet Soci-

alist Republics, the Republic of China, and in due course France, should have permanent seats. The General Assembly should elect six States to fill the non-permanent seats. These six States should be elected for a term of two years, three retiring each year. They should not be immediately eligible for re-election. In the first election of the non-permanent members three should be chosen by the General Assembly for one-year terms and three for two-year terms.

(B) PRINCIPAL FUNCTIONS AND POWERS

(1) In order to ensure prompt and effective action by the organization, members of the organization should by the Charter confer on the Security Council primary responsibility for the maintenance of international peace and security and should agree that in carrying out these duties under this responsibility it should act on their behalf.

(2) In discharging these duties the Security Council should act in accordance with the purposes and principles of the organization.

(3) The specific powers conferred on the Security Council in order to carry out these

duties are laid down in Chapter VIII.

(4) All members of the organization should obligate themselves to accept the decisions of the Security Council and to carry them out in accordance with the provisions of the Charter.

(5) In order to promote the establishment and maintenance of international peace and security with the least diversion of the world's human and economic resources for armament, the Security Council with the assistance of the military staff committee referred to in Chapter VIII, Section (B), paragraph 9, should have the responsibility for formulating plans for the establishment of a system of regulation of armaments for submission to the members of the organization.

(C) VOTING

(Note.—The question of voting procedure in the Security Council is still under consideration.)

(D) PROCEDURE

(1) The Security Council should be so organized as to be able to function continuously and each State member of the Security Council should be permanently represented at the head-quarters of the organization. It may hold meetings at such other places as in its judgment may best facilitate its work. There should be periodic meetings at which each State member of the Security Council could, if it so desired, be represented by a member of the Government or some other special representative.

(2) The Security Council should be empowered to set up such bodies or agencies as it may deem necessary for the performance of its functions, including regional sub-committees of the military staff committee.

(3) The Security Council should adopt its own rules of procedure, including the method

of selecting its president.

(4) Any member of the organization should participate in the discussion of any question brought before the Security Council whenever the Security Council considers that the interests of that member of the organization are especially affected.

(5) Any member of the organization not having a seat on the Security Council and any State not a member of the organization if it is a party to a dispute under consideration by the Security Council should be invited to participate in the discussion relating to the dispute.

CHAPTER VII—AN INTERNATIONAL COURT OF JUSTICE

(1) There should be an International Court of Justice which should constitute the principal judicial organ of the organization.

(2) The Court should be constituted and should function in accordance with a Statute which should be annexed to and be a part of

the Charter of the organization.

- (3) The Statute of the Court of International Justice should be either (a) the Statute of the Permanent Court of International Justice, continued in force with such modifications as may be desirable, or (b) a new Statute in the preparation of which the Statute of the Permanent Court of International Justice should be used as a basis.
- (4) All members of the organization should, ipso facto, be parties to the Statute of the International Court of Justice.
- (5) Conditions under which States not members of the organization may become parties to the Statute of the International Court of Justice should be determined in each case by the General Assembly upon the recommendation of the Security Council.

CHAPTER VIII—INTERNATIONAL PEACE AND SECURITY

(A) THE PACIFIC SETTLEMENT OF DISPUTES

(1) The Security Council should be empowered to investigate any dispute, or any situation which may lead to international friction or give rise to a dispute, in order to determine whether its continuance is likely to endanger the maintenance of international peace and security.

(2) Any State, whether a member of the organization or not, may bring any such dispute or situation to the attention of the General

Assembly or of the Security Council.

(3) The parties to any dispute the continuance of which is likely to endanger the maintenance of international peace and security should obligate themselves, first of all, to seek a solution by negotiation, mediation, conciliation, arbitration, or judicial settlement, or other peaceful means of their own choice. The Security Council should call upon the parties to settle their dispute by such means.

(4) If, nevertheless, parties to a dispute of the nature referred to in paragraph 3 fail to settle it by the means indicated in that paragraph, they should obligate themselves to refer it to the Security Council. The Security Council should in each case decide whether or not the continuance of the particular dispute is in fact likely to endanger the maintenance of international peace and security and, accordingly, whether the Security Council should deal with the dispute and, if so, whether it should take action under paragraph 5.

(5) The Security Council should be empowered at any stage of a dispute of the nature referred to in paragraph 3 to recommend appropriate procedures or methods of adjust-

ments.

(6) Justiciable disputes should normally be referred to the International Court of Justice. The Security Council should be empowered to refer to the Court for advice on legal questions connected with other disputes.

(7) The provisions of paragraphs 1-6 of Section VIII (A) should not apply to situations or disputes arising out of matters which by international law are solely within the domestic

jurisdiction of the State concerned.

(B) DETERMINATION OF THREATS TO THE PEACE OR ACTS OF AGGRESSION, AND ACTION WITH RESPECT THERETO

(1) Should the Security Council deem that a failure to settle a dispute in accordance with the procedures indicated in paragraph 3 of Section A, or in accordance with its recommendations made under paragraph (5) of Section (A), constitutes a threat to the maintenance of international peace and security, it should take any measures for the maintenance of international peace and security in accordance with the purposes and principles of the organization.

(2) In general the Security Council should determine the existence of any threat to the peace or act of aggression and should make recommendations or decide upon measures to

be taken to maintain or restore peace and security.

- (3) The Security Council should be empowered to determine what diplomatic, economic, or other measures not involving the use of armed force should be employed to give effect to its decisions, and to call upon members of the organization to apply such measures. Such measures may include complete or partial interruption of rail, sea, air, postal, telegraphic, radio, and other means of communication, and the severance of diplomatic and economic relations.
- (4) Should the Security Council consider such measures to be inadequate, it should be empowered to take such action by air, naval, or land forces as may be necessary to maintain or restore international peace and security. Such action may include demonstrations, blockade, and other operations by air, sea, or land forces of members of the organization.
- (5) In order that all members of the organization should contribute to the maintenance of international peace and security, they should undertake to make available to the Security Council, on its call and in accordance with a special agreement or agreements concluded among themselves, armed forces, facilities, and assistance necessary for the purpose of maintaining international peace and security. Such agreement or agreements should govern the numbers and types of forces and the nature of the facilities and assistance to be provided. The special agreement or agreements should be negotiated as soon as possible, and should in each case be subject to approval by the Security Council and to ratification by the signatory States in accordance with their constitutional processes.
- (6) In order to enable urgent military measures to be taken by the organization, there should be held immediately available by the members of the organization national air force contingents for combined international enforcement action. The strength and degree of readiness of these contingents and plans for their combined action should be determined by the Security Council, with the assistance of the military staff committee, within the limits laid down in the special agreement or agreements referred to in paragraph (5).
- (7) The action required to carry out the decisions of the Security Council for the maintenance of international peace and security should be taken by all members of the organization in co-operation, or by some of them, as the Security Council may determine. This undertaking should be carried out by the members

of the organization by their own action and through action of the appropriate specialized organizations and agencies of which they are members.

(8) Plans for the application of armed force should be made by the Security Council with the assistance of the military staff committee

referred to in paragraph (9).

- (9) There should be established a military staff committee, the functions of which should be to advise and assist the Security Council on all questions relating to the Security Council's military requirements for the maintenance of international peace and security, to the employment and command of forces placed at its disposal, to the regulation of armaments and to possible disarmament. It should be responsible under the Security Council for the strategic direction of any armed forces placed at the disposal of the Security Council. The committee should be composed of the Chiefs of Staff of the permanent members of the Security Council or their representatives. Any member of the organization not permanently represented on the committee should be invited by the committee to be associated with it when the efficient discharge of the committee's responsibilities requires that such a State should participate in its work. Questions of command of forces should be worked out subsequently.
- (10) The members of the organization should join in affording mutual assistance in carrying out the measures decided upon by the Security Council.
- (11) Any State, whether a member of the organization or not, which finds itself confronted with special economic problems arising from the carrying out of measures which have been decided upon by the Security Council should have the right to consult the Security Council in regard to a solution of these problems.

(C) REGIONAL ARRANGEMENTS

(1) Nothing in the Charter should preclude the existence of regional arrangements or agencies for dealing with such matters relating to the maintenance of international peace and security as are appropriate for regional action, provided such arrangements or agencies and their activities are consistent with the purposes and principles of the organization. The Security Council should encourage settlement of local disputes through such regional arrangements or by such regional agencies either on the initiative of the States concerned or by reference from the Security Council.

(2) The Security Council should, where appropriate, utilize such arrangements or agencies for enforcement action under its authority but no enforcement action should be taken under regional arrangements or by regional agencies without the authorization of the Security Council.

(3) The Security Council should at all times be kept fully informed of activities undertaken or in contemplation under regional arrangements or by regional agencies for the maintenance of international peace and security.

CHAPTER IX—INTERNATIONAL ECONOMIC AND SOCIAL CO-OPERATION

(A) PURPOSE AND RELATIONSHIP

- (1) With a view to the creation of conditions of stability and well-being which are necessary for peaceful and friendly relations among nations, the organization should facilitate solutions of international economic, social, and other humanitarian problems, and promote respect for human rights and fundamental freedoms. Responsibility for the discharge of this function should be vested in the General Assembly and under the authority of the General Assembly in an Economic and Social Council.
- (2) The various specialized economic, social, and other organizations and agencies would have responsibilities in their respective fields as defined in their statutes. Each such organization or agency should be brought into relationship with the organization on terms to be determined by agreement between the Economic and Social Council and the appropriate authorities of the specialized organization or agency, subject to approval by the General Assembly.

(B) Composition and Voting

The Economic and Social Council should consist of representatives of eighteen members of the organization. The States to be represented for this purpose should be elected by the General Assembly for terms of three years. Each such State should have one representative, who should have one vote. Decisions of the Economic and Social Council should be taken by simple majority vote of those present and voting.

(C) FUNCTIONS AND POWERS OF THE ECONOMIC AND SOCIAL COUNCIL

(1) The Economic and Social Council should be empowered: (a) To carry out, within the scope of its functions, recommendations of the General Assembly; (b) to make recommendations on its own initiative with respect to international, economic, social, and other humanitarian matters; (c) to receive and consider reports from the economic, social and other organizations or agencies brought into relationship with the organization, and to co-ordinate their activities through consultations with, and recommendations to such organizations or agencies; (d) to examine the administrative budgets of such specialized organizations or agencies with a view to making recommendations to the organization or agencies concerned; (e) to enable the secretary-general to provide information to the Security Council; (f) to assist the Security Council upon its request; and (g) to perform such other functions within the general scope of its competence as may be assigned to it by the General Assembly.

(D) ORGANIZATION AND PROCEDURE

(1) The Economic and Social Council should set up an economic commission, a social commission, and such other commissions as may be required. These commissions should consist of experts. There should be a permanent staff which should constitute a part of the secretariat of the organization.

(2) The Economic and Social Council should make suitable arrangements for representatives of the specialized organizations or agencies to participate without vote in its deliberations and in those of the commissions established by it.

(3) The Economic and Social Council should adopt its own rules of procedure and the method of selecting its president.

CHAPTER X—SECRETARIAT

(1) There should be a secretariat comprising a secretary-general and such staff as may be required. The secretary-general should be the chief administrative officer of the organization. He should be elected by the General Assembly on recommendation of the Security Council, for such term and under such conditions as are specified in the Charter.

(2) The secretary-general should act in that capacity in all meetings of the General Assembly, of the Security Council, and of the Economic and Social Council, and should make an annual report to the General Assembly on the work of the organization.

(3) The secretary-general should have the right to bring to the attention of the Security Council any matter which in his opinion may threaten international peace and security.

CHAPTER XI—AMENDMENTS

Amendments should come into force for all members of the organization when they have been adopted by a vote of two-thirds of the members of the General Assembly and ratified in accordance with their respective constitutional processes by the members of the organization having permanent membership on the Security Council and by a majority of the other members of the organization.

CHAPTER XII—TRANSITIONAL ARRANGEMENTS

(1) Pending the coming into force of the special agreement or agreements referred to in Chapter VIII, section (B), paragraph (5), and in accordance with the provisions of paragraph 5 of the Four-Nation Declaration, signed at Moscow on October 30th, 1943, the State parties to that declaration should consult with one another and as occasion arises with other members of the organization with a view to such joint action on behalf of the organization as may be necessary for the purpose of maintaining international peace and security.

(2) No provision of the Charter should preclude action taken or authorized in relation to enemy States as a result of the present war by the Governments having responsibility for such

action.

Note.—In addition to the question of voting procedure in the Security Council, referred to in Chapter VI, several other questions are still under consideration.

A Tribute to the Achievements of the A.E.A.F.

By SIR T. LEIGH-MALLORY

BEFORE leaving to take up his new appointment as Air Commander-in-Chief in South-East Asia, Air Chief Marshal Sir Trafford Leigh-Mallory reviewed the work of his AFAF Command since D Day

of his A.E.A.F. Command since D Day.

"It must be evident to all," he said, "that without the air forces our armies could never be where they are now. We could never have

achieved what we had achieved if the enemy had been able to interfere with our concentrations and movement. Our ground forces could never decisively have defeated the German Army in Normandy had the Germans had free use of their communication routes for reinforcements. Our victories have been the result of joint allied effort.



"Air superiority was a vital prerequisite for the invasion of Europe, and by ceaseless fighting and vigilance it has been achieved. The credit for this is due not only to the air forces which have taken part in this battle but to all those allied airmen who have ceaselessly fought the Luftwaffe from the Battle of Britain onwards. The result of all this has been that we were able to apply overwhelming air power to reduce our enemy both in the air and on the ground—a factor which has produced conditions which have paved the way for our longed-for victory."

HEAVY BOMBING

R.A.F. Bomber Command had throughout struck devastating blows, equally essential to the initial assault and to subsequent operations. By its heavy attacks in direct support of our armies it had obliterated resistance and had proved the most humane means of overcoming enemy strong-points. It also had to its credit the main offensive against the enemy transportation system during the preparatory period. The United States 8th Air Force, by large-scale daylight operations, had dealt telling blows in support of the ground battle, while its fighters, whose normal role was bomber escort, had succeeded beyond all expectations as low-flying destroyers. By their attacks on German oil and aircraft output the American bombers had restricted the enemy's movement on the ground and in the air. He was sincerely grateful for the willing co-operation of General Spaatz and General Doolittle, who repeatedly had proved themselves such capable commanders.

Of the two Tactical Air Forces he could not speak too highly. They had made it impossible for the enemy to control the battle and had reduced his channels of reinforcement in such a way as to make it possible for our ground forces to win decisive victories. Our fighters had completely overshadowed the Luftwaffe both by day and night, and not only in numbers had they proved superior. For a distance of 150 miles from the battle front our air forces had completely dominated enemy communication routes, while the direct support of our armies had become a day-to-day part of the normal fighting.

The air chief marshal also paid tribute to the work of the other branches of the allied air forces who worked "behind the scenes" the airfield construction units, reconnaissance units, radiolocation units, beach parties, ancthose who serviced and maintained the supply columns. He was particularly appreciative of the wholehearted co-operation of our great American allies, whose air crews had displayed gallantry and efficiency of the very highest order and had built up superb traditions as a fighting force. He also praised the work of the Dominions squadrons and of the allied units which, even when asked to bomb their own countries, had not hesitated, and who had played a part in the defence of this island.

DESTRUCTION OF TANKS

The defeat of the German counter-attack at Mortain was largely the work of the air forces. In one day alone Typhoons accounted for more than 130 German tanks. On 18th August, after the Falaise gap had been sealed, the R.A.F. 2nd Tactical Air Force alone destroyed 1,159 vehicles and damaged 1,700 more, destroyed 124 tanks and knocked out another 100. The United States 9th Air Force also accounted for 400 vehicles. When remnants of the defeated German Seventh Army were trying to struggle across the Seine the 9th Air Force destroyed 77 German aircraft in combat and 49 more on the ground, while R.A.F. light bombers claimed a record destruction of 1,400 motor-vehicles in one evening. In three attacks it was estimated that nearly 3,000 vehicles were smashed. No fewer than 7,000 dead Germans were found among their wrecked vehicles in the neighbourhood of the Seine crossings. This transport concentration might go down to history as one of the outstanding targets of the war.

Demonstrating the effect of our attacks on railways, he said that at Trappes no fewer than 90 locomotives and 900 destroyed railway wagons were found. The total destruction carried out by our fighters and fighter-bombers during August alone was 873 tanks, 12,441 motor vehicles, 1,413 locomotives, 9,926 rail vehicles, and 406 river barges.

As our communication lines became more strained following the swift advance of the armies, air supply became increasingly important. Between 9th August and 3rd September our aircraft flew more than 13,000 tons of supplies to the forward positions and brought back wounded on the return journeys. In all, 103,742 casualties had been evacuated by air between D Day and the first week of October.

Rear Admiral Hj. Riiser-Larsen K.C.Sr.O., K.C.B., MESSAGE OF GREETINGS FROM

Commander-in-Chief, Royal Norwegian Air Force

It is with the greatest pleasure that I take this opportunity of sending a nessage of greeting to our comrades-in-arms of the R.A.F

in 1940 the German brute of a heavy-weight went from kindergarten to kindergarten and knocked us out one at a time until Goliath met David in he Battle of Britain. By this time, the Air Forces of the Royal Norwegian Army and Navy were being reorganized in Canada after the two months of hard struggle in Norway against the overwhelming power of the Luftwaffe.

to Norway, with the result that more than 2,400 of the best of our boys came across the North Sea that year, followed by many more later. Since then all Norwegian squadrons have been fighting under Fighter Command and Coastal Command. A number of crews are engaged in other Commands, Thanks to Bomber Command we have paid back to the In June, 1941, we were back in the fight again. The news of this spread Huns a much greater bomb-load than the Luftwaffe used in flattening out quite defenceless Norwegian towns.

Already, in October, 1940, the first bomber was ferried across the

If one tries to imagine the feelings of the Norwegian youth towards the Huns generally and the Gestapo particularly for the treatment of the Norwegian people, one will understand what a blessing it is that the Royal Air Force has given us this opportunity of carrying on the fight and doing Atlantic by a Norwegian pilot, and many have followed

I take this opportunity of thanking all personnel of the Royal Air Force for the very great help and friendship extended to us during these years, a friendship which will last for all years to come.

should decide to establish a separate Royal Norwegian Air Force on the It is an extraordinary coincidence that the Norwegian Government same day as the Tirpitz was sent to the bottom of one of our fjords by the R.A.F. I take that as a good omen.

Thanking you again for what lies behind us, I beg to extend from the R.N.A.F. all the best wishes for the R.A.F. in the coming year.



Air Co

Air Commodore L. F. E. Wouters C.B.E., M.C.,

MESSAGE OF GREETINGS FROM

Officer Commanding the Belgian Air Force

Let us go back a few years to 1940 . . . The Belgian Air Force had received a terrible beating. Most of its aircraft had been destroyed, many pilots killed or wounded in a battle against overwhelming odds. But if bodies and hearts were bleening, their spirit was undaunted.

When the fighting was over in the skies of Belgium and France our airmen knew that there was still a battle to fight, and they made their way to England. By Christmas a new Belgian Air Force had been formed.

Some of our pilots took a glorious part in the Battle of Great Britain, some died, but an increasing number of young and determined people stood up to take their share of the fight.

To-day we have a potential Air Force more powerful than ever before. England is saved, and with England, the world. Belgium is once more a free country. The sacrifice of our airmen has not been made in vain.

Force for the hospitality that was given to the Belgian Air Force, five years ago. We were lacking in ground crews and in aircraft; it was impossible for us to re-form a separate Air Force. We were given the privilege, of which we are proud, to join the R.A.F. as a Belgian Section.

Between the airmen of our two countries, bonds of friendship have been created that will last for ever. Let us finish together the job of building a durable peace.

My wish to you all, on the eve of the coming celebrations of Christmas and New Year is—God Speed and Good Hunting to Victory!





Stick and String

By Squadron Leader D. R. Parkinson

THE revival of Air Defence of Great Britain from March to October, 1944, must recall to many the former A.D.G.B. in which they served. It brings, too, the realization that Time has marched on, the Royal Air Force has celebrated its twenty-sixth birthday, and the years have brought changes. One of the curious things about the human memory is that it refuses to recognize as obsolescent the scenes and objects of former years. To-day we can feel superior when we remember that 150 m.p.h. was as fast as you could fly in a biplane decorated with squadron markings. We can smile indulgently at two Lewis guns firing forward through the prop by the grace of God and a little help from Count Constantinesco. Yet if one were to walk round a corner and find oneself upon an aerodrome of those days one would accept it as a reality and instantly apply oneself to one's duties. One is frequently assailed by the conviction that the Air Force of the 'twenties is still in being, and operating, somewhere. And it is certain that after a few days with it one would regard as a Wellsian dream the size, power, armament and equipment of the aircraft of to-day.

A.D.G.B. . . . A.D.G.B. The sound conjures up the scenes and activities of some of the Fighter squadrons that formed part of Fighting Area in 1927 and 1928. They flew biplanes with aircooled radial engines, Grebes, Gamecocks, Woodcocks and Siskins. Radials had supplanted rotaries and the airframe design was cleaner, but in general these aircraft represented the fruits of nine years' development of the Sopwith Camels and Snipes that rode the fury and the flame of 1918.

Kenley was the most popular station in Fighting Area with the airman of the 'twenties. It was conveniently near London, whither he could travel swiftly and comfortably by Southern Electric, and whence he could return from Charing Cross on the 11.37. His passes were normally made out to 0045 hours to enable him to use this train, and not to 2359 as was the custom elsewhere. He could get to Croydon by bus and see the latest film at the Davis Theatre, and Caterham was within easy walking distance. He lived in a hut among several rows of huts. and the hangars stood two hundred yards away. When the aircraft were wheeled out and lined up into wind he often thought the Gamecock good to look at. It had a short squat fuselage, narrow gap, staggered mainplanes and oleo undercart. The Jupiter engine was closely cowled to the exhaust ring, and a big spinner was mounted on the wooden prop. Finished in silver dope with the squadron markings, it looked aggressive and workmanlike. No. 23 Squadron's markings were red and blue squares—they showed up well against the silver dope.

The days of the biplane fighter were the great days of aerobatics, and an airman could watch many an upward roll from the tarmac as he peered into the sky through narrowed eyes. Often when his aircraft landed in the late afternoon he would stoop and look ruefully at the oil plastering the underneath of the fuselage and wing roots, as the pilot descended stiffly from the cockpit. The Jupiter VI used to throw out a good deal of oil in the inverted position. but hot water could usually be obtained from the boilerhouse at the side of the hangar, and hard scrubbers and soft soap soon restored the aircraft to normal cleanliness. Sometimes the pilot would strip off his tunic and scrub away too, pricked with remorse at the results of his aerobatic fun.

The problem of starting up engines was responsible for a strange-looking machine that could be seen on most aerodromes in these times. It was known as the Hucks starter, after its inventor, and it bridged the gap between swinging by hand and the push-button inbuilt starter-motor of to-day. It was a modified model T Ford chassis with an overhead shaft driven by chain from the transmission. The shaft, which overhung in front, terminated in a telescopic drive which extended against a spring and engaged with dogs on the airscrew hub. The drill was to drive the Hucks squarely up facing the aircraft, chock the wheels, engage the dogs and start the drive, whereupon the big wooden prop would turn while the Hucks threw itself from side to side on its springs until the engine started. Perhaps the most striking characteristic was the long, straight mudguards sloping skittishly at 45 degrees, painted red and white to facilitate recognition from the air. Altogether it made a picturesque contribution to the workaday scene. No one who has heard it can ever forget the distant high-pitched, long-drawn-out summons from a ground crew clustered round an expectant aeroplane. "Hu-u-u-ucks!" It was a good word to shout downwind between bursts from other people's engines. And it produced the story of the L.A.C. who came out of the C.T.T.B. and whispered it despairingly in the corridor. Hucks drivers became highly skilled in the swift discharge of their duties, and their curious mounts scuttled from one aeroplane to another like robot bees impollinating a succession of blooms.

While fighters occupied most of the Kenley sky, other aircraft appeared from time to time. Across the road in what were known as the Vimy hangars, Hawker Horsleys were being assembled and test-flown at intervals. "Matrons" we called them. Their Rolls-Royce Condor engines had a remarkably slow tick-over, the reduction gear gave out a curious wooden sound at close quarters. The Horsley was a daybomber; she used to get her tail well up as soon as she started the take-off run.

Sometimes torpedo-carrying and reconnaissance aircraft would come up from Gosport, bringing a tang of salt spray to landlocked Kenley. Blackburns they were, with undercarriages of a complex character. If one stood in line with the take off or landing the wheels "Charlestoned" in a manner agreeable to see.

On Monday mornings throughout Fighting Area the guns of the Battle Flight aircraft were loaded and fired at the butts. The week after No. 32 Squadron began to re-arm from Grebes to Siskins there was a rousing incident. The first Siskin was duly lashed down to a trestle, wheels chocked, tail squatters detailed, and the engine run up. The first burst from the guns brought down a good deal of glass from the roof of an adjacent hangar, and the rounds went away into the blue. The Grebe tail trestle had insufficiently elevated the tail of the Siskin, and her guns were pointing over the top of the butts. The glass fell inside the hangar with a great clatter, the rounds fell to earth we know not where. But harmlessly, which was a mercy.

Kenley was popular, apart from its position, because it was a small place, Station H.Q. and two squadrons, so everybody knew everybody else. There was much healthy rivalry between the squadrons, a colour-hoisting parade each Wednesday morning, a reasonable amount of week-end leave, and no guards. Every month, however, a parachute guard had to be mounted to watch over the great silk canopies hung up overnight in a stores hangar before being inspected. Your correspondent once passed an amusing couple of hours from 0200, sitting in the basket seat of a Bristol Fighter fuselage, keeping an eye on the ghostly white stalagmites about him, reading aloud to them "Rhymes of the R.A.F." of blessed memory.

People who served at Kenley will remember Hayes Lane, that narrow, tortuous, steep road leading off the end of the aerodrome down through the woods and houses on the hillside to Kenley railway station in the Caterham valley. Perhaps some of them have pushed a broken-down motor-cycle on a stormy moonless night round those bends and up the endless way, trying to get in before 0045 hours. Not an easy task in breeches and puttees, which were then worn as best blue.

The official designation was "pantaloons" for other ranks. Shapeless things they were when issued, but the camp tailors for a trifling sum would perform an intricate operation known as "taking them in." This was a contradiction in terms, as it made them curve gracefully out from the knees. No airman with any pretension to smartness wore them "as issued."

Officers had white collars and shirts, turnups on their slacks, and canes with crooked handles. It was noticed that tall, thin officers invariably had tall thin canes, while those of their short, portly colleagues inclined to *em*bonpoint. Perhaps this was attributable to some exquisite sensibility on the part of the outfitters.

Other ranks had canes, too. Little short black ones with a large knob embossed with the crown and eagle. An airman walking out in best blue carried his cane at the trail in the right hand. Before he could salute an officer he had to place it under the left arm and grasp the knob firmly with the left hand. This procedure undoubtedly made for smartness in saluting; not only had it to begin early to allow the salute to come up in good time, it also kept the left arm motionless for the six paces of its duration.

Airmen under the rank of sergeant did not wear collars and ties, their tunics "buttoned five," as the tailors say, and the tunic collars fastened with three hooks and eyes. The field service cap of to-day had not been made in grey blue; all ranks wore the service dress.

They wore it at Upavon in 1927 and 1928 and regarded it as incomplete, for in that remote part of Salisbury Plain the troops thought they should have qualified for frontier medals. Nos. 3 and 17 Squadrons lived there. It is, of course, one of the oldest aerodromes in England, the birthplace of the C.F.S. before the last war.

In 1927 an *ab initio* Training Flight was formed, to which Nos. 3, 17, 23 and 32 Squadrons sent small detachments of instructors, pupil pilots, ground staff and aeroplanes. The object was to provide ten or twelve new sergeant-pilots for the squadrons concerned, and in scope

it makes an interesting comparison with the Empire Air Training Scheme of 1939.

The Flight occupied one of the then remaining C.F.S. hangars near the Andover Road on No. 17 Squadron's aerodrome. Dual commenced on Avro 504Ns. and in the post-solo stages continued on dual Siskins. Meanwhile Nos. 3 and 17 Squadrons flew their Woodcocks by day and occasionally by night. Upavon boasted two aerodromes with fine new hangars, and right through the camp went the Andover road past a spinny known as Jenny's Firs, on the boundary of No. 17's aerodrome.

The weather used to be gauged every morning by looking across at those trees, whereas in No. 3 Squadron the airmen standing on the tarmac would contemplate the tiny spire of Salisbury Cathedral standing in a fold of the Plain seventeen miles away. If the weather seemed fit for flying the cry would go up "On the Rory O'Moores!" and men would bend their backs to the handles of the heavy doors. Then the Woodcocks would be wheeled out, placed in a row on the apron, chocked, and checked over. They were larger than Gamecocks, with two bays, a deep fuselage, and no stagger. No. 3 Squadron's marking was a plain green band; it invited the ribald to make funny remarks about margarine. No. 17's consisted of two parallel wavy black lines and defied contemptuous allusion.

The summer sun could shine very brightly upon the rolling Downland in those carefree peace-time years. The air was laden with the smell of thyme and burnt oil, and away on the horizon the White Horse could be seen on the slope of a hill near Marlborough. As the day wore on thoughts turned to the long evening that stretched ahead, when one could ride a motor-bike to Pewsey, Devizes, or Salisbury. If penury forbade, one could walk for hours over fields and downland covered with long grass, studded with clover and half a hundred varieties of wild flowers, and come back to quarters at twilight full of fresh air and peace and a comfortable fatigue.

The winter wind could blow very fiercely across the naked Plain and make the short, dark days arduous. On frosty starlit nights the stoves were kept well stoked, and if the door of the hut were opened too often it brought a shout of condemnatory abuse. The fire picquet hut near the guardroom, the last building for some miles, felt the full malice of the weather. A week's fire picquet in December or January was a spartan duty. Greatcoats lay atop every bed, and in spite of their aid, in spite of the stoves urged and coaxed to give their utmost

heat, the nights passed to the sound of wailing and buffetting outside, the groan and start of timber under the floor, and a slow inexorable chill creeping into the limbs.

During the Christmas break of 1927 there was a very heavy fall of snow and the majority of airmen on leave had the sense to signal for extensions. Consequently the few who returned to time found the camp isolated, and next day had the task of digging out the long road down to the village so that M.T. could get through. As clear a case of "carrying the can" as I remember.

Joe Soap was the legendary airman who carried the original can. He became a synonym for anyone who had the misfortune to be assigned an unwelcome duty in the presence of his fellows, or to be temporarily misemployed in a status lower than his own. "I'm Joe Soap," he would say lugubriously, "and I'm carrying the something can." Thus he became the can-man. Cans of varying sizes had, from time to time, to be transported. One might hear, for instance, that "A" Flight, detailed for some duty, considered it was carrying the can. Even a squadron could find itself in this mortifying predicament, and the earnest mind boggled at the size of can involved.

Because of its isolation Upavon extended a warmer welcome to visitors than they could look for in the eclectic atmosphere of Kenley. A flight of Grebes in tight formation would come down out of the sun, dive across the hangars to show their chequered Duxford markings, and then float in over the Andover Road and touch down in a bunch. The troops at Duxford used to boast that their pilots were so good that all the hens in the district laid chequered eggs. There were three Siskins from Tangmere who flew many a time to Upavon and landed when Jenny's Firs could not be seen from the tarmac and all hangar doors were firmly shut. Sometimes they would tell us they had not seen the deck since taking off, and in 1927 instrument flying was in its infancy. No turn-and-bank indicator graced the dashboard of a Siskin, wheel-brakes and flaps were unknown and high pressure tyres had not yet given way to balloons.

Fighting Area, A.D.G.B., looked forward each year to the Bombing and Gunnery Courses. The squadrons went away in high summer and spent three weeks at practice camps on the East Coast, where the pilots carried out target practice on convenient mudflats. At Sutton Bridge and North Coates Fittes all ranks lived under canvas and enjoyed the change from brick quarters and wooden huts.

It was a good thing to get attached to the advance party which travelled by road in Leyland 3-tonners, 1918 models with high radiators, metal windshields and hard tyres. They were loaded with Bowsers, tail trolleys, trestles, chocks, engine tool-kits and other ground equipment. Two or three airmen, in full marching order, were perched high up under each hood, N.C.Os. took their places beside the drivers, and the convoy set out on its journey. From Kenley it was the practice to stay a night at Henlow, where the men slept in a big grim building they called Ellis Island. At a big station like this one always ran into some old friends, and there was a cinema belonging to the camp. Next morning passing the guardroom one could bestow upon the rows of busy workshops a valedictory and condescending glance as the Leylands headed for Wisbech and The Wash.

Sutton Bridge was reached in the late afternoon of the second day, and the lorries halted alongside the Bessonneau hangars on the aerodrome. The advance party unloaded and bestowed the Flight equipment before they sought the bell tents in which they were to sleep for the next three weeks. The main party, who had travelled by train, usually arrived just too late to help off-load the lorries, and the pilots of course flew over between luncheon and tea.

A canal ran between high banks down one side of the aerodrome, and pilots could and did approach unseen (though not unheard) to leap into the sky before our delighted eyes and dive this way and that upon the unsuspecting and the earthbound. Sometimes when the squadron aircraft were away over the targets a flight of Grebes from Duxford or Hornchurch would appear and enliven the summer sky with aerobatics, while the airmen looked up from their chores and murmured approval. The Armourers were prominent during Practice Camp weeks, shooting terrific lines as they changed gun barrels or bombed up the aircraft. They enticed fitters and riggers into the unending task of making up .303 ammunition into belts for the Lewis guns. During the long summer days the Avro flew to and from Kenley to bring up mail and comforts for the troops, and finally the course came to an end and the Leylands were loaded up for the return journey. When they drove off down the long straight road one looked out over a tailboard and remembered a snapshot taken by a relative of exactly similar vehicles in the Asiago in 1918.

The culmination of the year was the Hendon Display which took place on the last Saturday in July. It is said that every dog has his day, and it may be said of the lion pup with wings

that he blazed into prominence at the end of the London season. By 1924 the Display had become an accepted date in the calendar, and drew vast crowds to Hendon Aerodrome.

There was plenty of good showmanship in the way it was presented, and the flying was in the highest degree spirited, exciting and memorable. The most indifferent spectator could not forget the Fairey Foxes diving across the enclosures making a noise like all the fiends in hell. Or the matchless timing of the Flycatchers doing their converging bombing, crossing and recrossing the target while the hair of the initiated stood up on their necks for fear an aircraft should go in to bomb two seconds late. Or the synchronized aerobatics by two Gamecocks diving toward each other and twisting up to precisely the same height to hang on their props a mile apart and then fall off and dive past each other again, drawing new and equally flawless patterns with their coloured smoke trails.

In between these exciting events Virginias and Hyderabads droned over in formation, and there would be some drill by squadrons of Horsleys. C.F.S. instructors played the fool in Avro 504Ns. An Army Co-op Squadron showed off their M.P.U. A selection of "boats" would sail sedately round at 500 feet and people exclaimed "Coo, look, flying-boats! They can't land here if the engines go wrong." Meanwhile, on the ground the R.A.F. faced the world and shamed the devil, greeted old friends and passed judicious criticism on the flying. It strolled round the Experimental Park, too, and ran appraising eyes over the Bulldog, the Wapiti, the Overstrand—inevitably to be christened Bandstand—the Fairy 111F, and a number of aircraft destined never to go into service for one reason and another.

Late in the afternoon an observation balloon. or Blimp, was let up to seven or eight hundred feet, attacked by fighters and destroyed by fire. This event was a hardy annual that always went well with the crowd. (The R.A.F. used to say it took Larkhill a year to prepare the burnt sacrifice, and immediately a Display was over work began on another one for the next year.) When the flames got a good hold a legendary person known as Major Sandbags made a dignified parachute descent from the observation car, and was credited in the Service mind with another bar to his legendary D.F.C. Larkhill types always rushed out to recover and preserve him from the rude stares of the hoi polloi. and few can have seen him at close quarters. He was generally pictured as fearless but filleted.

The last main item on the programme took the form of a "set piece." It was noisy, colourful and written so as to show off as many of the functions of air power as possible. The crowd loved this event with its mysterious wood-and-canvas buildings, the reconnaissance aircraft that opened the act, the bomber squadrons that appeared so promptly, and the detonations and the clouds of acrid smoke. Hostile fighters diving down out of the sun, spirited combats, the rat-tat-tat of Lewis guns, vanquished aircraft tottering down amid brave flashes, explosions, and tell-tale trails of smoke (to flatten out and land craftily, while no one was looking). Then the Victorias would land majestically behind the burning town to disembark troops for the purpose of seizing keypoints, for already the Staff College pundits were thinking in terms of airborne divisions.

By 1830 hours the crowds were moving toward the exits, the car parks were emptying; only a few schoolboys lingered in the hope of seeing just one more machine land or take off. The Display was over, the training year had come to an end . . .

The vision of Kenley and Upavon, of Sutton Bridge and Hendon, grows dimmer as the years pass by. Change is among the subtlest of human emotions because it is unperceived for so long. To-day only a tiny percentage of serving officers and men can say they have been inspected by Lord Trenchard. The words "aeroplane" and "aerodrome" are obsolete; they have drawn away into the past together with biplanes, tail trolleys, Scarfe rings and puttees.

These things are history now, and one may perhaps think of them lying dusty and neglected in a gigantic property basket belonging to a

play that will not be seen again.

Nostalgia 'Aeronautica

By LIEUTENANT COMMANDER B. J. HURREN (Fleet Air Arm)

THE crash of bombs and crumbling houses, the din, fret and fury of war in the air, have given to the common people of all nations a picture of aviation as one almost exclusively of destruction. It is a sad commentary on the modern world that the average young man of 23 to-day has more knowledge of driving a bomber and fighter than of a motorcar or boat.

The gruelling test of the past five years has done much to obliterate the memories of days when aviation was a thrilling sport. Those days, barely a generation behind, seem possessed to-day of the means of arousing a nostalgia aeronautica which future generations may revel in.

It is not easy to appreciate how thrilling aviation was in its teething days, though I confess to referring exclusively to power-driven flight as opposed to the balloon flights which captured public imagination from 1783 onwards. Then there were many extraordinary flights, and I do not think it is generally appreciated even by modern youth that ballunatics (as they were nicknamed) a hundred years ago or thereabouts had ascended far higher than our best bombers.

Look to more recent times and, astonishing as it may seem, in 1910 a flying meeting could attract some 25,000 to 30,000 paying spectators. Events were likely to be packed with thrills—there were no parachutes then and fire in the air or engine failure was common enough to ensure some sort of gladiatorial thrill to onlookers.

Society took to flying as, some years before, it had taken to yachting and later took to golf and contract bridge. It was essentially fashionable to fly or be interested in aviation (so that if you did not rate yourself as a daring aeronaut at least you could present, say, twenty-five gold sovereigns or a silver trophy to be contested by others).

Nevertheless, if an afternoon at Hendon airfield or Brooklands or Bournemouth was fashionable, and if there were big money prizes open to high-spirited youth (prizes of several thousand pounds were for winning by flights of no more than 100 or 150 miles) I do not think the rapture of early flying rested in these prosaic spheres. The true thrill came from the unknown nature of the adventure in days when the height of controversy raged as to whether

the biplane or the monoplane was the better aircraft. Indeed, that controversy was not settled until the middle 1930's, for the simple fact is that the whole course of aviation has turned on engine development.

Every schoolboy will confidently assert that to-morrow the Air Age will dawn. Because even the experts agree that we stand on the threshold of an illustrious future in the air, it may be well and of more than passing interest to record the state of our progress less than forty years ago.

In the year 1910 Richard Ferris was bold enough to write a book entitled "How to Fly." It is not every author's lot to have his book reviewed so long after it has passed out of print, but Richard Ferris is to be congratulated on some paragraphs of absorbing interest. It need hardly be said, especially to the modern generation, that the one thing Richard Ferris does not write about is how to fly. He expatiates on all sorts of problems aeronautical, but he does not show how to fly, for the reason—strongly implicit in his own words—that he does not know himself the full answer although he is generous with the words and counsel of others.

It will be impossible, even for the air passenger of to-day without any special knowledge, not to be thrilled by some of his explanations. Let us plunge into the instructive parts, especially where the (allegedly) well-known aviator C. K. Hamilton lets fall a few aeronautical gems of wisdom:—

"So far as air currents are concerned, I rely entirely on instinctive action; but my ear is always on the alert. The danger signal of the aviator is when he hears his motor miss an explosion. Then he knows that trouble is in store. Sometimes he can speed up his engine, just as an automobile driver does, and get it to renew its normal action. But if he fails in this, and the motor stops, he must dip his deflecting planes and try to negotiate a landing in open country.

"Sometimes there is no preliminary warning from the motor that it is going to cease working. That is the time when the aviator must be prepared to act quickly. Unless the deflecting planes are manipulated instantly, aviator and aeroplane will rapidly land a tangled mass on the ground."

Unfortunately no evidence is offered as to whether that well-known aviator C. K. Hamilton found himself hoist by his own advice, but he adds disarmingly: "Unless experience has taught the aviator to maintain his equilibrium instinctively he is sure to come to grief."

How to obtain this experience in maintaining equilibrium? The only clue is the delightful statement that "The Wright brothers spent years in learning the art of balancing in the air before they appeared in public as aviators..."

This art of balancing appears to be a short cut to piloting: it is definitely something to be acquired, like "hands" in riding, for our author insists that you must first learn the art of balancing and only then "the aviator must learn the mechanism by which he may control his machine." As to this mechanism, it will be interesting to the modern aviator to learn that "the steering wheel controls both the horizontal and vertical movements of the aeroplane. It is a feeler to the aviator, warning him of the condition of the air currents, and for this reason must not be grasped too firmly. It is to be held steady, yet loosely enough to transmit any wavering force in the air to the sensitive touch of the pilot, enabling him instinctively to rise or dip as the current compels."

In these days of servo-motor relay mechanism and mechanically driven slave units which assist a pilot it is with difficulty that the original methods can be believed. "The preserving of an even keel is accomplished by small planes hinged between the mainplanes at the outer ends." (Note: These are what are now called ailerons.) "They are operated by arms, projecting from the back of the aviator's seat, which embrace his shoulders on each side and are moved by the swaying of his body. They are automatic in action, for when the aeroplane sags downward on one side the pilot naturally leans the other way to preserve his balance..."

As late as 1910 it appears there was considerable hesitancy in accepting that everyday word of 1944, "aeroplane." In the chapter explaining and defining aeronautical terms appears the following:—

"Aerodrome.—A term used by Professor Langley as a better name for the aeroplane; but latterly it has been applied to the buildings in which airships are housed, and also in a few instances as a name for the course laid out for aeronautical contests."

Whilst doubt thus enshrouds the terms "aerodrome" and "aeroplane," a novel note is struck in the term "Aeronef," asserted to be another name for an aeroplane

Mystery surrounded that intangible substance, the air, which was the essential to aeronautics. Graphically, words of Sir Hiram Maxim are quoted to explain some of its quality. He says: "On one occasion I was present when a bonded warehouse in New York, containing

10,000 barrels of alcohol, was burned. . . . I walked completely round the fire and found things just as I expected. The wind was blowing a perfect hurricane through every street in the direction of the fire, although it was dead calm everywhere else; the flames mounted straight up to an enormous height . . ." and so our author draws on this parallel to explain the nature of air movements (wind) over the surface of the earth.

If perhaps this gives a reminder of what happened at Hamburg on the R.A.F.'s big raids, no less significant in these days of V.1 flyingbombs, is the following: "In 1849 the first actual employment of the balloon in warfare took place.... The engineers (Austrian, besieging Venice) made a number of Montgolfier balloons out of paper. These were large enough to carry bombs weighing 30 lb. for half an hour before coming down. These war balloons were taken to the windward side of the city, and after a pilot balloon had been floated over the point where the bombs were to fall, and the time of flight ascertained, the fuses of the bombs were set for the same time and the war balloons released. The actual damage was not great but the moral effect on the people was enormous. . . As these little Montgolfiers were unmanned, perhaps they are not strictly entitled to be dignified by the name of war balloon, being only what in this day would be called aerial bombs."

And in this day, doodlebugs, buzz-bombs and aerial torpedoes!

So you think that airgraphs and microfilms for air transit are novel ideas? Then read this:

"During the siege of Paris in 1870 . . . in all 164 persons left by balloon, always at night, and there were carried 9 tons of dispatches and 3,000,000 letters. At first dogs were carried to bring back replies, but none ever returned. Then carrier pigeons were used successfully. Replies were set in type and printed. These printed sheets were reduced by photography so that 16 folio pages of print, containing 32,000 words, were reduced to a space of 2 inches by 11 inches on the thinnest of gelatine film. Twenty of these films were packed in a quill and constituted the load for each pigeon. When received in Paris the films were enlarged by a magic lantern, copied and delivered to the persons addressed."

Remember! That was seventy years before the "modern" microfilm service and airgraph!

No less interesting are the 1910 comments on helicopters and gliders. The Cornu helicopter, with 8-cylinder Antoinette engine of 24 h.p.,

turning two 20-foot rotors, was able to lift a total weight of 723 lb. to a height of five feet and sustain itself there for one minute. The book clearly distinguishes between the helicopter and what it calls the "gyropter" about which reference is scanty although: "Upon a trial with a 10 h.p. motor connected to one of the gyropters, that end of the apparatus was lifted from the ground at 55 revolutions per minute—the boiler pressure being 800 lb./sq. inch at which pressure it burst, wrecking the machine."

Recent press reports indicate that some 200,000 Air Training Corps boys have qualified as glider pilots or made successful glider launchings. In 1910, however, things would have been different, for glider flight was apparently a matter of swaying the body forwards, backwards or sideways to achieve the desired direction. "Landing is accomplished by shoving the body backward, thus tilting up the front of the 'plane. This checks the speed. . . . While it is necessary to make glides against the wind it is not wise to attempt flights when the wind blows harder than 10 m.p.h. While the flight may be successful, the landing may be disastrous."

How little were understood the basic principles of flight! According to the author, Wilbur Wright, on being asked what kept his machine in the air and why it did not fall to the ground, replied: "It stays up because it doesn't have time to fall." On the same principle, it is explained, a person skating on thin ice will pass safely if he goes fast, as the ice has not time to break! And this masterpiece of explanation concludes: "This explains why an aeroplane must move swiftly to stay up in the air which has much less density than either water or ice."

I have no desire, however, to poke Charlie at the brave aeronauts of 1910. I am given, after reading this absorbing book, to wondering whether the aeronauts of 1970 will not be in a position to mock and ridicule us. It is known already, for instance, that New York is technically within one hour's flight of London, and Australia can be reached in a forenoon, times which put to shame all present-day computations.

The thing that emerges most clearly from these faded and nostalgic pages is the recognition of courage and daring enterprise with which is coupled implicity the mental courage and boldness of designers as apart from the physical qualities of the actual flyers. I can therefore see no more appropriate concluding paragraph than that in the book, in which tribute is paid to the aviators at the Blackpool and Doncaster meet-

ings of 1909 when Le Blon and Latham flew in "fierce gales." It is said that spectators and others openly charged these men with foolhardiness, "but it was of the first importance that it should be demonstrated that these delicately built machines can be handled safely in the most turbulent weather; and the fact that it has been done successfully will inspire every other aviator with a greater degree of confidence. . . . Such confidence is by far the largest

element in safe and successful flying" and, it may be added in 1944, the overriding consideration of aircraft designers and constructors to-day.

The foregoing article is based on the book "How to Fly," published by Nelson in 1910. The author of this article is indebted to Flight Lieutenant Tommy Rose for drawing his attention to it.

A Night Fighter's Notes

By Flight Lieutenant W. Thomas Ingham

S we bank over there passes under the wing a vision of surf crisp and white in the sun, a yellow strand, and seagulls gliding in and out of the shadows of the cliffs. Cool meadows and ordered patches of red soil, a church steeple, white road, cornfields halfreaped, a flag flying and high tower of cumulus slide past. The compass needle moves smoothly round and, red on red, comes to rest parallel with the grid lines. We are on course with only the sea and a couple of fishing smacks between us and a new continent. In a few moments we are waggling our wings as we near them, a last bit of England and, if the Met. and our calculations are correct, our last link with land for a considerable time. They will be home for tea; we expect to be in Africa.

China grins at me and says, "Well, this is what we've been waiting for."

And so it was. For several months we had been training aircrews and watching them go off to different jobs in interesting parts of the world, feeling as each new course passed through its operational training and the crews were posted to squadrons that we were being drawn further from the main stream of activity. It was bewildering and hard to believe, even when the train was steaming south and we, with first-class hangovers, were on it, that the chains of instructordom had fallen from us.

Now we were well out in the "Bay," engines running sweetly, log up to date and gauges checked and double-checked, nothing to do to make the required landfall but maintain a steady airspeed and check the drift now and again. I pour out some coffee and pass it to China, but he does not take the cup into his hand. I follow his gaze and see three aircraft

on the horizon. The coffee goes back in the thermos.

"We'd better be on the safe side," he says, and we begin to climb.

Sure enough, whatever their mission, they are coming our way and we can make out the rather gaunt tail and bulbous nose of the Junkers 88. They are intending to head us off and take up line astern positions for attack. We have the advantage of a thousand feet and put our nose down to gain speed and pass them with plenty of room to spare. Jerry is now coming in behind us and "heaping on the coals." China throttles back sufficiently to draw them and makes a few hard turns as if in desperation to get away. We keep just beyond the range of their fire while I run a heated commentary à la George Allison. Before long two of them break away, but the third, an eager fellow, hangs on and follows us up and down and through every turn, hoping perhaps for engine trouble or a mistake on our part.

His presence becomes annoying and I am glad when China says "I can't resist this," and climbs towards a layer of cloud.

We begin to zig-zag systematically and let him get nearer. As we swing from side to side he follows. Then we plunge into cloud. Using his instruments, China puts her into a tight orbit. There is a mad whirl of sea and sky as we come out of cloud. The 88 is darting across our bows and we give him a long full deflection burst. A piece of cowling flies from his port engine—it seems to be soaring upwards like a leaf in the wild wind—and then comes a spout of flame. We follow him down, expecting him to hit the sea, but he turns into wind and ditches very smartly. The other two Ju.'s are

coming back and we have no time to watch the capers below as the crew try to scramble away from the aircraft.

"That'll larn 'im."
"Where are we?"

"Take me for a magician?" I retort.

I give China a new course and take out the thermos again—though I feel more like a double brandy.

We spend our first night in Africa under canvas, in a pine grove on the edge of the Mediterranean, but we are off first thing in the morning, vaguely aware that there was moonlight on the sea, clusters of stars among the trees—and mosquitoes. We are awed by the vastness of this continent and amazed by its infinite variety. A pale, grey waste of sand gives place to wooded hill-sides, a range of jagged hills to a wide salt lake, and now there is a series of sheltered bays and white harbour towns, iron cliffs, twisted gorges, dried-up river beds, scarpland roads, lonely farmsteads and tilled fields merging without hedge or boundary into the countryside. And always to the south an alpland of snowy mountains; to the north the blue sea.

We are leaving land behind now after a glimpse of the Bay of Tunis, where the water is bluer than is good for the soul. Pantellaria, bombed into submission, is seen on the left, and, with a turn of the head, Lampedusa, which surrendered to a pilot who made a forced landing there, so clear is this atmosphere. Then the yellow rock-fortress of Malta rises out of the sea, a heap of rubble, until at closer view its countless number of tiny fields, testimony of the untiring industry of its people, its busy shipyards and bristling harbour, swing into view. Here is indeed a house built upon the rock, secure and unconquerable. As we touch down we wonder what part our squadron will play in its history. We have not long to wait.

The next morning the air is buzzing. The Sicilian affair has begun and we are covering the landings at night. Pilots, whom we had met only the night before, are now at breakfast telling, some with excited faces and suitable demonstrations, of their successes of the night before. The sky had been full of Huns. It was like knocking down ninepins. Most of the crews had accounted for at least one Jerry each. The telephone bell rang confirming a fourth for Squadron Leader Ian and his navigator Dave. There is great rejoicing. Four in one night had happened only once before.

The crews "on" for the night are right on the top line, with kites tested and equipment

on board long before dusk.

We are now right in the middle of squadron life again. It savours well after the chill outlook in the world of training. As a new crew we are given a quiet "beat" and tantalizingly we hear other aircraft being vectored on to Hostiles while we are patrolling an apparently empty portion of sky. At last we get a brief chase, a Dornier silhouetted for a moment against a bank of cloud. We are overtaking him when he sees us and races for cloud cover. There is time to give him a couple of short bursts at long range, little sparks of light winking along his fuselage as our fire strikes him before he disappears. We do not know his fate but, next morning, a German crew is picked up in a dinghy. Another crew claims to have hit a Jerry in the same area, but as the pilot refuses to give any details at all of his combat we are able only to claim a half each. It has been another good night for the squadron, but tomorrow is to be the day—or rather the night.

A sad incident marred the day—prelude to the big night. A friend, whom I had known before in England, took up an aircraft on test and completely vanished. He was last seen to the south of the Island but that was all we knew. A Walrus and several other kites took part in a search which went on right through

the night. But the sea is a big place.

One patrol had already gone off at dusk and we were at dispersal waiting either to be called into the air or to take over patrol at the appointed time. So different it seemed from the parallel scene at home the winter before. Crews on readiness sat round the stove clad in Mae Wests, mufflers and flying-boots, playing poker or yarning. Here in khaki drill slacks and shirt we were outside seeking air to breathe and watching the last patch of red fade from the sky. We could just make out the slim grace of C for Cynthia as she stood at the entrance to her bay—a protection from bomb splinters constructed of sand-filled petrol cans. The stars came out, at first tiny points of quiet light, and then in great clusters and daisy chains; an unfamiliar sky, with the Plough dipping low over the horizon.

The telephone bell.

Instinctively I knew it was for us and I grabbed my helmet.

"Scramble two aircraft."

China and I were racing for C for Cynthia to be first off. And we were. Within a few minutes we had made our way round the dimly lit perimeter track and were drawing up at the marshalling point. A quick inspection of the cockpit, a rev up of the motors to check the magnetos; then from China: "O.K.?"

"O.K."

Cynthia is moving forward, then racing with a thrilling sense of speed and power till the glow from the flarepath has fallen away behind and below. Undercarriage up, stick forward a little to gain climbing speed. We now belong to the air and call up the controller.

"One Seven airborne."

Glancing back at the aerodrome our companion plane looks like a toy as its red and green wing-tip lights are seen running along the run-way and being borne lightly upwards.

The moon is coming up above some low clouds. Suddenly it breaks free and the whole sea below is spread out like a stippled silver tray. It is as if we were being plunged into another world, one of rare and strange beauty, when the voice comes again, "Several bandits crossing port to starboard at two miles."

We turn to anticipate them and peer into the milkiness in the atmosphere caused by the moon. Presently, and a spasm of excitement surges over us, we both at once see a Dornier, the moonlight lighting up its high wing. We swing round to get on to his tail. The Jerry has seen us, however, and we anticipate a long chase as he dives and twists to throw us off. Lucky for us he tries a hard orbit but we turn easily inside him. China gives a short burst at close range. A piece breaks away from the tail unit. The tail gunner is still firing but we know the Dornier is no longer capable of serious evasive action and drop back out of his range and try a long burst. The starboard engine is on fire and there is a glow from the cockpit. He begins to spin and we watch him sink in a series of whirls to the sea. The flames are quickly snuffed out and the water is ruffled for a minute or two.

We turn back to patrol and immediately are given another vector. This results in our sighting the exhausts of another raider. The moon is behind cloud and we close in quickly, too quickly, for, before we identify him, he gives us a very accurate dose of fire, his tracer darting past us for a few dread moments like a shower of hail. China returns his fire and sparks begin to come from him—all the makings of a fire when our port engine begins to run rough. We level out and see a jagged hole in the top of the cowling. We know that it is time to return to base and China feathers the prop. Only then do we realize how far we are away, and even when the chain of lights that mark the run-way can first be seen it is an eternity before we are making our unfamiliar right-hand approach and touch-down, breathing a big sigh of relief when the undercarriage holds firm.

Everyone is going crazy. It is a free-for-all. Squadron Leader Ian has a score of five for one sortie. This is a record for night-fighting and we are determined as soon as there is a lull in activity to celebrate with a ginormous party. Tich has two, Johnnie Junior, Pinks and Hawk-eye one each. Our intelligence and signals officers are hugging one another in a dance of delight. Everyone in the Aircrew's Mess is turned out of bed—and, for once, don't mind.

* * *

Then Malta suddenly became very quiet. Jerry was not coming any more at night. We were beginning to suffer from reaction and from "island fever." It was as well that at this time we discovered the rest camp at St. Paul's Bay. We were having a day off and the morning was enlivened as we set out for the rest camp by a grandstand view of a reconnaissance plane being shot down. All it was at first was one vapour trail converging on another—an 88 and a Spit. Soon our 88 was falling out of the sky—we recognized it as it got closer—and we were so fascinated that it was not until it seemed about to fall on us that we thought to run. As it happened it dropped harmlessly into the sea, all the crew having baled out.

We walked, Dusty, Bob, Hardy and I, most of the way to St. Paul's by the sea road. The Gregale was blowing and lashing the sea into a creamy surf. It was refreshing after the characteristic stickiness of the climate. We persuaded ourselves that the exercise was doing us good until a lift came along and we found it prudent not to refuse. And that lift brought us in contact with a congenial body of men, controllers—Scotty, Mundy and Buckle were three of them—whom hitherto we had known only as voices over the R/T. A fine party got underweigh, the first of a number. A lovely place the Bay, and that garden which falls in terraces right down to the water's edge, out-doing even the imagination of Hollywood.

As the wintry weather came on some of us were fortunate enough to go on detachments to other parts of the Mediterranean and, although rains and gales kept us on the ground a good deal we had a lot of fun and a bit of luck. Benny carried out a remarkable interception, without any ground control, on a Hun flying at sea level. Don and Oporto and ourselves were covering a convoy when an attack developed and we got separated. Don found himself among a formation of 88s.

Manœuving into position for attack, he tried to pick them off one by one. One of them dropped out but the rest kept together and their return fire made it very hot for him. However, he did not break away until he had emptied all his ammo. into them. The aircraft was torn to ribbons and Don landed at base without an undercarriage. The C.O. almost wept when he saw what was left of the kite—for it was his own and on loan to Don.

"Pickled in Piccadilly." This was the text of a cable the Adjutant was holding in his hand, and it mean that Ian and Dave, whose "tour" had expired—they had shot down fourteen enemy aircraft at night—had arrived back in the Home Country. We laughed but found England very near. "Pickled in Piccadilly" meant to us the greenness of the country after the glaring yellow rock, rain for this whirling dust, deep woods for these few mis-shapen trees, the

dykes of the Pennines for these countless, meaningless, untidy walls. It meant the clusive charm of England which is something to do with the comfort of the hearth in winter, the village cricket ground, Tudor cottages, Rupert Brook, that breath-catching hour between rains in April, Greta Bridge and Ullswater, November sunsets and the Boat Race . . . and nothing to do with its execrable weather, sprawling industrialism, slums and income tax.

A former occupant of my room has left behind a photographic magazine sent to him by a fellow New Zealander. Across the cover is written, "Just a little reminder of the glorious South Island." As I turn the pages and see a panoramic view of Dunedin and Macandrew Bay, of Mount Murchison and the tumbling Sutherland Falls, I wonder if England is not also at the other side of the world. Then I realize that England can only be where one's home and friends are. Or what is the answer?

Statistical Review—January to September, 1944

NORTH EUROPEAN THEATRE.

BOMBING OPERATIONS

January.

LL air operations were considerably handicapped in the middle of the month by dense fog which persisted for four days and nights, and in some areas remained for as long as six days and nights. Gales near the ground and very strong winds at flying levels were also other hampering meteorological features which followed the fog. Conditions were, however, good on several successive nights both at the beginning and towards the close of the month. Over the month as a whole, weather was very good on eight nights, variable on seven, poor on nine and bad on seven.

The main feature of the night strategic bombing during January was the continuation of the Battle of Berlin. Six heavy attacks were launched against the German capital during the month, on the nights of 1st/2nd, 2nd/3rd, 20th/21st, 27th/28th, 28th/29th and 30th/31st. Well over 9,300 tons of bombs were discharged on Berlin during these six attacks: a little over 200 aircraft were lost in these attacks and in other operations carried out by Bomber Command on the same nights.

Major attacks were also made against Stettin on the night of 5th/6th, on Brunswick on 14th/15th and on Magdeburg on 21st/22nd.

Objectives in Germany were also raided on a small scale on nineteen nights. Intruder operations were carried out on fifteen nights, during which attacks were made on airfields over a wide area.

Over 18,000 tons of bombs were dropped by Bomber Command during the month, approximately 16,500 tons falling on targets in Germany. There was an increase in the tonnage discharged on objectives in Occupied Territory, but this was almost entirely accounted for by attacks on military objectives in Northern France. This type of objective was attacked on eleven nights.

February.

February's weather did not favour the night bombers, unlike last year when this month was unusually clear of the anticipated seasonal disadvantages. The mixture of this year was more according to standard—low cloud, flurries of slight snow, low freezing levels and poor visibility. Over the month as a whole only five nights provided conditions the meteorologists graded as "good."

The strategic bombing of Germany developed a new comprehensiveness during February. The

Anglo-American operations from bases in Great Britain were more closely interlocked than ever before and at the same time co-related attacks on targets in the Reich were made from the south.

The same target, Regensburg, was attacked in daylight on the 25th from Mediterranean bases as from airfields in this country.

Mediterranean night bombers also made interlocking attacks on the objectives of day bombing. Bomber Command also introduced the tactical development of the double raid during the month.

NIGHT BOMBING.—Five major bombing operations were carried out by Bomber Command—all in the latter half of the month. The first full-scale operation on 15th/16th saw the heaviest tonnage of bombs, 2,500 tons, dropped in a single night, discharged on the German capital. The other four major operations were against Leipzig (over 2,300 tons, 19th/20th), Stuttgart (2,000 tons, 20th/21st), Schweinfurt (over 1,000 aircraft, 24th/25th) and Augsburg (1,700 tons, 25th/26th). Bomber Command's Leipzig attack was followed up by, and the Schweinfurt and Augsburg operations preceded by, daylight attacks by heavy bombers of the 8th Air Force of the U.S.A.A.F.

German targets were raided on a small scale on nineteen nights, including those on which major operations were carried out.

Objectives in occupied territory were raided on eight nights on a minor scale. The attack on the Gnome and Rhone aero-engine factory at Limoges on 8th/9th was particularly successful.

Intruder operations were carried out on twentytwo nights many airfields being bombed during the course of this activity.

DAY BOMBING.—Major operations by day from this country were again carried out by U.S. heavy bombers, which were supported by R.A.F., Dominion and Allied fighter squadrons as well as by U.S. fighters. Together with the 9th Air Force of the U.S.A.A.F., medium, light and fighter bombers of the 2nd British Tactical Air Force were very active during the month. Nearly 3,000 bombing sorties were carried out by this force on twenty days of the month. Offensive sorties were flown on every day of the month. Military objectives in Northern France were bombed on nineteen days, and nine airfield attacks were also made.

DAYLIGHT ACTIVITY.—Daylight operations by the R.A.F., Dominion and Allied squadrons were also hampered in the middle of January by weather conditions which made flying extremely difficult, although sorties of one kind or another were flown every day. In spite of this weather handicap the American day-bombing effort from British bases was supplemented by offensive operations on twenty-two days. More than 2,500 bombing sorties were made during the month by medium, light and fighter bombers of R.A.F., Dominion and Allied squadrons. On eighteen of these days military objectives in Northern France were bombed. Cannon-gun and machine-gun attacks on various military targets were also made on fifteen days.

R.A.F., Dominion and Allied squadrons carried out escort duties and sweeps on twenty-two days.

March.

March was an exceptionally dry month and relatively free from very low cloud at night. This, however, was offset by frequent bad visibility and during one period of six successive nights most of our home operational bases were fog enveloped and the same hampering meteorological feature was experienced intermittently at other times. Conditions for operations were very good on nine nights, and either variable or poor other nights.

NIGHT BOMBING.—Strategic bombing by night was the heaviest yet developed. More than 8,000 aircraft were sent on night bombing missions during the month of which over 6,000 bombers operated against Germany. Approximately 20,000 tons were discharged on the Reich and some 8,000 tons on targets in enemy occupied territory.

In addition, Bomber Command had one if its most active months of sea-mining.

March also saw the first operation on which Bomber Command despatched more than a thousand heavy bombers, on the night of 15th/16th, and more than a thousand aircraft were sent out on three other nights later in the month.

For the first time more than 3,000 tons of bombs were dropped on a single target in one night—on Frankfurt on the night of 18th/19th March. This weight of bombs was again dropped on Frankfurt on the night of 22nd/23rd. Five major operations were also conducted against Germany during the month: Stuttgart, 1st/2nd and 15th/16th; Berlin, 24th/25th; Essen, 26th/27th, and Nuremberg, 30th/31st.

German targets were raided on a small scale on twenty-eight nights during the month. The weight of this raiding was generally increased, Mosquitoes dropping many 4,000 lb. bombs in this type of operation. On one night, for example, eleven 4,000 lb. bombs were dropped on industrial targets in Dortmund, which was one of the objectives in that particular night's activity.

OCCUPIED TERRITORY.—Attacks on Occupied Territory by night were also a feature of Bomber

Command's work, being conducted on twentyone nights. Operations against railway centres
in France were particularly effective. Reconnaissance reports immediately after the attacks
on railway objectives at Amiens on 15th/16th
and 16th/17th described the damage as very
heavy and photographic evidence has fully substantiated this. A recent reconnaissance proved
that little repair had yet been possible to this important railway centre. Heavy attacks in relation to the size of the target were also made on
the railway centres at Trappes, 6th/7th; Le Mans,
7th/8th and 13th/14th; Laon, 23rd/24th; Aulnoye, 25th/26th; Courtrai, 26th/27th, and
Vaires, 29th/30th.

A reconnaissance made of the railway centre at Le Mans on the 24th showed little evidence of repairs having been made and no apparent attempt even to clear wrecked wagons.

Among the precision-bombing attacks by small forces of heavy bombers were those on Meulan - les - Mureaux (assembly plant) and Albert (aircraft factory), 2nd/3rd; Marignane (aircraft factory), 9th/10th; Clermont Ferrand (aero-engine repair factory), Ossun (experimental factory), Chateauroux (aircraft factory) and La Ricamarie (needle-bearing works), 10th/11th; Clermont Ferrand (rubber and tyre factory), 16th/17th; Bergerac (explosive works), 18th/19th; Angouleme (explosive works), 20th/21st; and Lyons (aero-engine works) on 29th/30th.

Intruder operations were carried out on twentyfour nights, during which some forty bombing attacks were made on airfields and ten enemy aircraft were destroyed on and around their bases.

DAY BOMBING.—The major operations by day from this country were again borne by U.S. Strategic bombers and were supported by R.A.F., Dominion and Allied fighter squadrons, as well as by U.S. fighters. Escort duties or sweeps were carried out by British fighters on twenty-nine days of the month.

Bombing missions were fulfilled on twentyfour days by British medium, light and fighterbombers of the Allied Expeditionary Air Force whose aircraft flew on every day and twenty-six nights. British aircraft dropped some thousand tons of bombs in daylight bombing attacks on occupied territory. On twenty-three days the objectives included military installations in Northern France.

A few Bomber Command aircraft took part in these attacks on nine days.

A pril

NIGHT BOMBING.—The weather during April was on the whole favourable for night operations.

Fifteen nights were very good. Three nights were variable but mainly good. Eight were poor and four bad.

Bomber Command despatched more aircraft than ever before to attack targets in Germany and Occupied Europe. 33,000 tons of bombs were dropped (approximately 37,000 American tons), an increase of nearly 6,000 tons on the previous month's record figure of more than 27,000 tons. An increasing proportion of the month's effort was directed to railway and other precision targets in North-West France and other parts of Occupied Europe.

There was also a great increase in the record for tons dropped in a single night; the highest figure is now more than 4,500 tons, dropped in attacks on Cologne and railway yards in France and Belgium on the night of 20th/21st April.

The percentage of losses was lower even than in March, and indeed, with the exception of February, 1943, which was a month of exceptional weather, was the lowest since strategic bombing on a heavy scale began more than two years ago.

A number of long-range attacks on German industrial cities was made during April, and the bombers penetrated far into Central and Southern Germany. An attack on Munich on the night of April 24th/25th, involving very deep penetration of fighter defended areas, is believed to have caused as much damage in relation to the scale of attack as any of the most successful attacks by Bomber Command on German cities.

More than a thousand bombers were despatched on four occasions, on 18th/19th, 20th/21st, 22nd/23 and 26th/27th. Six major attacks on German targets were made: on Aachen, 11th/12th; Cologne, 20th/21st; Dusseldorf, 22nd/23rd; Karlsruhe, 24th/25th; Essen, 26th/27th; and Friedrichshafen, 27th/28th.

Small-scale raids on German targets were made on twenty-one nights, and over forty objectives were attacked. The increased weight of these attacks was maintained, many 4,000-lb. bombs being discharged.

OCCUPIED TERRITORY.—A feature of the April strategic bombing was the attack on rail communications in enemy occupied territory. This commenced on the night of 9th/10th with attacks on Lille and Villeneuve St. Georges, and continued on the following night when over 3,500 tons of bombs fell upon rail targets at Aulnoye, Laon, Tergnier, Ghent and Tours. This was followed on 18th/19th by an attack on railways at Rouen, Tergnier, Noisy-le-Sec and Juvisy, when over 4,000 tons were discharged. Other heavy attacks on similar targets were on 20th/21st (Lens, Chambly, La Chap-

pelle, Ottignies), 22nd/23rd (Laon), 26th/27th (Villeneuve) and 27th/28th (Aulnoye, Montzen).

Attacks on occupied territory were made on seventeen nights and included precision attacks no Vilvorde (signals depot), 23rd/24th; St. Medard (explosive works), 29th/30th; Maintenon (ammunition dump), 30th/31st.

DAY BOMBING.—The U.S. Air Forces continued the strategic bombing of major targets by day, supported by R.A.F., Dominion and Allied fighter squadrons as well as by U.S. fighters. Aircraft of the Allied Expeditionary Air Force made over 22,000 sorties during the month and flew on every day and twenty-three nights. By night over ninety enemy airfields were attacked. Escort duties or sweeps were carried out on twenty-four days.

British medium, light and fighter-bombers of the A.E.A.F. fulfilled bombing missions on twenty-two days. Military objectives were attacked on seventeen days and other targets included railways and communications in enemy occupied territory, coastal defences and airfields. Aircraft of the Second Tactical Air Force dropped 1,700 tons of bombs on targets in enemy occupied territory. Enemy shipping was attacked on nine occasions.

A few Bomber Command aircraft operated against land targets on five days.

May

NIGHT BOMBING.—Over the month as a whole weather was very good on thirteen nights, variable but mainly good on twelve nights and poor no six nights. For the first month since last August none of the nights could be classified as bad.

During the month a total of some 44,000 offensive and defensive sorties was made by R.A.F., Dominion and Allied home-based aircraft.

Strategic bombing of major targets by night during May was carried out by aircraft of Bomber Command on twenty-seven nights out of thirty-one. They flew more than 11,000 sorties and dropped over 37,000 tons of bombs on Germany and Occupied Territory. In addition, a large number of mines were laid in enemy waters. This is the greatest weight of bombs ever dropped in a single month by the Command. On two nights (22nd/23rd and 27th/28th) more than a thousand aircraft were despatched.

Over 8,500 tons of bombs fell on targets in Germany, mainly in heavy attacks on Duisberg (21st/22nd), Dortmund (22nd/23rd), Brunswick (22nd/23rd) and Aachen (24th/25th and on 27th/28th). In addition, separate Mosquito forces have been out on twenty-six nights, over thirty different objectives being attacked, includ-

ing Berlin on five occasions. The use of 4,000-lb. bombs was again a feature of the Mosquito attacks.

R.A.F. intruders of A.E.A.F. attacked more than 150 airfields by night.

OCCUPIED TERRITORY.—The main effort by Bomber Command during May was against targets in Occupied Territory. Of the total of 37,000 tons over 28,500 were dropped on comparatively small targets, numbering nearly 100, with every crew under strict orders to make sure of their target or return with their bombs.

The targets successfully attacked included railway centres, ammunition dumps, military depots, airfield buildings, explosive works, aircraft and other factories in German hands, and a number of military objectives. Two military depots received heavy attacks: Mailly, 1,700 tons (3rd/4th), and Bourg-Leopold, 1,200 tons (27th/28th). Photographic reconnaissance has proved the overwhelming effect of such heavy precision bombing.

So many railway centres have now been attacked that the Germans, at first in a position to repair large railway yards in a few weeks, have now been forced to leave many such targets in a devastated condition. Vast stores of explosives and other material have been lost to the enemy in attacks on ammunition dumps, where blast walls and revetments proved to be no protection against hundreds of bombs falling within a few yards of each other.

Many airfield buildings have been hit, and industrial targets in France and the Low Countries, including an important ball-bearing works at Annecy, near the Italian frontier, have been destroyed or severely damaged.

DAY BOMBING.—Bombing of major targets by day was continued by the U.S. Air Forces, escorted by U.S. fighters and on occasions supported by R.A.F., Dominion and Allied fighter squadrons. Aircraft of the Allied Expeditionary Air Force flew on every day during the month and on thirty nights. Escort duties or sweeps were carried out on twenty-seven days.

British medium, light and fighter-bomber squadrons of the A.E.A.F. were employed on a large scale throughout the month, operating against precision targets, more than doubling the number of this type of sortie flown during April. Military objectives were attacked on nineteen days, and a variety of targets included railways, oil and ammunition stores, radio installations, coastal defences, airfields, road and rail bridges, enemy transport and military headquarters. Some Bomber Command aircraft also operated against land targets during the day on different occasions.

PROPAGANDA.—The dropping of propaganda leaflets, magazines and newspapers on Germany and occupied countries was continued throughout the month. The total of nearly 1,264,000,000 dropped in four and a half years of war was increased. The people in the occupied countries and in Germany were thus being kept fully informed of what was actually happening in the free world.

U-BOATS AND SHIPPING.

Even Coastal Command's persistent antisubmarine patrolling was broken for a space of twenty-four hours in the middle of January, although reconnaissance was carried out throughout the month. Photographic reconnaissances were made on twenty-five days. Convoys were escorted on twenty-six days, while fighters flew shipping protection sorties on twenty-one days.

Shipping was attacked by Coastal Command aircraft on seven days, thirty-seven vessels of all types being attacked. Aircraft of other Commands also attacked a number of other vessels

on five days.

Mines were laid by Bomber Command on ten

nights.

From West Africa operations were continuous throughout the month. On most days searches were made for blockade-runners, and almost every day anti-submarine patrols were flown. Shipping was escorted on every day.

Throughout February, Coastal Command's anti-U-boat patrols and reconnaissances were again continuous. On twenty-eight days photographic reconnaissance sorties were made. Convoys were escorted on twenty-two days and fighters provided shipping protection on twenty-six days.

Coastal Command aircraft went out on antishipping missions on nine occasions, some twenty-seven vessels being attacked. Aircraft of the 2nd British Tactical Air Force also attacked shipping on eleven days and five nights, some sixty-five vessels of all kinds being hit.

Bomber Command's mine-laying programme was the heaviest carried out in any month since April of last year. This type of operation was performed on thirteen nights.

From West Africa escort for shipping was provided on every day except one and searches for blockade runners, and anti-submarine patrols were made on most other days.

Coastal Command operated more aircraft during March than ever before. Anti-submarine patrols and reconnaissances continued without pause and photographic reconnaissance flights were made on every day except one. Convoys were escorted on twenty-seven days by Coastal Command aircraft while fighters provided shipping protection on twenty-eight days and two nights.

Coastal Command aircraft went out on antishipping operations on sixteen occasions by day and attacked more than eighty vessels. Patrols were also made on fifteen nights, six vessels being attacked. Fighters also carried out offensive shipping patrols on twenty-four days, attacking more than fifty vessels of all types.

Bomber Command aircraft laid mines in enemy waters on fourteen nights.

From West Africa aircraft escorted shipping and flew anti-submarine patrols on most of the month.

Coastal Command were actively concerned in the war of attrition against enemy shipping in Western Europe, and constantly attacked the enemy's coastal convoys used for moving troops, oil, supplies and valuable war material between the various ports on Germany's "West Wall."

During the twelve-month period ending 31st March, 1944, Coastal Command despatched on anti-shipping operations more than 4,500 sorties. Twenty-five ships totalling some 115,000 tons were sunk or otherwise lost to the enemy. Sixteen ships, totalling more than 47,000 tons, were seriously damaged and some thirty vessels damaged.

Aircraft of Coastal Command flew on every day during April. Anti-submarine patrols were flown on twenty-eight days and photographic reconnaissances on twenty-nine. Convoys were escorted on seventeen days.

Anti-shipping operations were conducted on twelve days and over eighty vessels attacked.

Minelaying in enemy waters was again a feature of Bomber Command's operations, March's effort being almost doubled. Sea-mining was carried out on nineteen nights during April.

Aircraft of Coastal Command flew over 3,500 sorties during May, flying on every day. Antisubmarine patrols were flown every day and photographic reconnaissance on twenty-seven. Convoys were escorted on eleven days.

Anti-shipping operations were carried out on seventeen days, and over 150 vessels were attacked. Aircraft of the A.E.A.F. attacked shipping on fourteen occasions.

Bomber Command carried out sea-mining on twenty-five nights of the month, April's effort being increased.

Aircraft of West Africa Command flew antisubmarine patrols on nineteen days, shipping escort duties on twenty-one days, and coastal reconnaissance patrols on ten days during the month.

ENEMY ACTION AGAINST THIS COUNTRY.

Not a single bomb was dropped on this country by day during February. By night, bombs were dropped on six nights. In the whole month some 300 aircraft were employed. Nearly 10 per cent. of that force have been established as casualties; more than half the night raiders came over on two nights, 21st/22nd and 29th/30th.

The enemy increased his effort against this country considerably during February. Raids were made on Great Britain on twelve nights and bombs were dropped by day on one occasion.

The enemy came in appreciable force on seven of these nights. Only three aircraft made landfall by day. Of the night raiders fifty-four were destroyed over this country apart from those shot down over their bases by intruders. One enemy aircraft was destroyed in daylight.

The total effort made by the enemy during March was on a similar scale to that made in February. Bombs were dropped on fifteen nights, and on six of these nights the attacks were made on an appreciable scale. Fifty-eight of these night raiders were destroyed.

Seven aircraft made landfall by day and one of these was destroyed, no bombs being dropped.

Enemy attacks against this country during April showed a decrease in the total scale of effort compared with the previous month. Enemy aircraft made landfall on fourteen nights, and bombs were dropped on thirteen only. Four of these attacks were on an appreciable scale, and forty-three of the night raiders were destroyed.

Enemy aircraft made landfall on five days but

no bombs were dropped.

There was again a decrease in the total scale of enemy attacks on Britain during May. Enemy aircraft made landfall on fourteen nights, bombs being dropped on twelve nights only. Three attacks were on an appreciable scale, and the total effort was directed mainly against coastal areas of Southern England. Twenty-nine raiders were destroyed by night.

Enemy aircraft made landfall on one day only, no bombs being dropped. One enemy aircraft

was destroyed by day.

June to September GENERAL

The month of June saw a noteworthy change in the use of air-power. Separate air forces, without losing any of their individuality, or their capacity for their own particular tasks, were, at times, welded into one gigantic air arm, striking powerful blows to aid the armies on the Western Front. For example, R.A.F. heavy bombers, specially built for strategic bombing, were freely and successfully used against tactical targets. Air Defence of Great Britain, in spite of other pre-occupations, sent intruders far into France, and maintained constant day and night patrols over the beach-heads and assault areas in Normandy.

R.A.F. aircraft of Bomber Command, 2nd Tactical Air Force, Air Defence of Great Britain and Coastal Command flew a total of over 77,000 sorties during the month.

Throughout this period and including the pre-invasion month Bomber Command ground crews maintained a daily serviceability of the astounding figure of 100 per cent.

BOMBING OPERATIONS

In June aircraft of Bomber Command operated on twenty-nine nights and dropped a record weight of bombs on targets in Germany and

occupied territory.

Well over 56,000 tons (equivalent to nearly 64,000 American tons) were dropped. The greater part were directed at night on strategical and tactical targets to assist the invasion armies. Over fifty attacks were made on key railway and road points, and twenty-one coastal batteries were bombed, including the ten vital batteries on the invasion coast at the invasion point which were attacked on 5th/6th, the eve of the landing.

Other targets bombed were wireless stations, troops and tank concentrations, airfields and

fuel dumps.

On 14th June strong forces of Lancasters made two attacks in daylight, with fighter escort, on the E-boat pens, and a concentration of E-boats, R-boats and other vessels in Le Havre. 12,000-lb. bombs were dropped with the idea of raising a tidal wave inside the pens. The following day two attacks, this time by Lancasters and Halifaxes, were made in daylight on Boulogne. All these attacks were so successful that at least eighty vessels were sunk or damaged in the two ports, most of them sunk and a substantial proportion of the German forces in the Channel were put out of action.

Bomber Command aircraft operated on every night and on thirty days during July. Outstanding features of the month's operations were:—

(a) The renewal of heavy attacks on German centres of production, coupled with the development of the Command's contribution to the

Le Général Martial Valin

Chef d'Etat-Major Général de l'Armée de l'Air

MESSAGE OF GREETINGS FROM

France rises to-day free and enthusiastic in spite of her weakness and with renewed energy eager to give her Allies the maximum help for the final effort.

When Mr. Churchill visited the capital the people of Paris, truly representative of the whole country, acclaimed him and by the warmth of their welcome asserted the bonds of friendship and love between France and Great Britain, who had stood by her all through the bitter days since 1940.

French airmen came from all parts of the world and will never forget the helping hand that enabled them to muster on friendly soil and fight again. Small units at first, then whole squadrons took off under British colours and Lorraine Crosses and finally under French colours to give their lives side by side with their British comrades in arms. Thus they were able to take part in the glorious battle that was to free their country. Whether in training schools or in action, they always found in the British units the brotherly welcome and help that have made for a deep and lasting friendship.

They are proud to share some of the glory that has rewarded the wings of the R.A.F.

This is Christmas, we are on the threshold of the New Year. On behalf of all the French Air Force I want to express to you and to the officers, non-commissioned officers and other ranks of the R.A.F. the wish that this friendship and sincere co-operation shall become ever greater and carry us to victory in war and victory in peace.



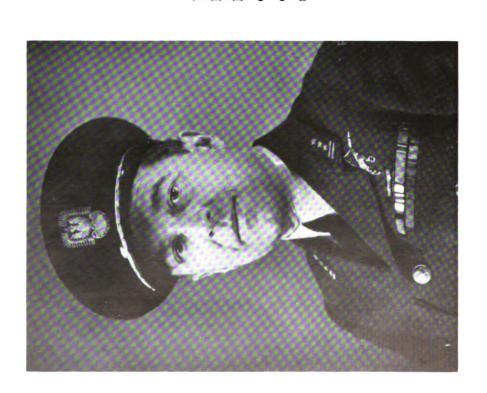
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MESSAGE OF GREETING FROM

Air Vice-Marshal Mateusz Izycki

Inspector General of Polish Air Force

On behalf of all the officers and men of the Polish Air Force I wish to extend to all officers and men of the Royal Air Force my hearty greetings for a happy Christmas and a New Year which I hope will bring us very near to complete victory over our common enemy. I trust that the spirit of co-operation we have enjoyed during the war may be continued and even further extended in times of peace to come.



Anglo-American offensive against oil supplies.

(b) The three massive operations in close support of the 2nd Army in Normandy and deep support by attacks on communications leading to the battle area.

(c) The sustained offensive against the flying

bomb and rocket potential of the enemy.

The aggregate tonnage for the month was again a record—57,500 tons (equivalent to 64,400 American tons) of which more than 13,000 tons fell on targets in Germany. The number of sorties flown by aircraft of the Command also constituted a record.

Mines were laid in enemy waters on twenty-

four nights.

R.A.F. Bomber Command aircraft operated on thirty days and twenty-six nights during August. On six of these days and on four nights the operations were on a negligible scale. On five nights and three days more than a thousand

aircraft were despatched.

The emphasis on daylight operations by Bomber Command, which has been progressively increasing in recent months, reached a stage in August where the sorties by day exceeded those by night. More than 10,000 sorties were flown in daylight and 40,000 tons of bombs were dropped, and by night 25,000 tons. The aggregate tonnage for the month was 65,000 tons (equivalent to 73,000 American tons) of which 14,000 tons fell on targets in Germany. This was again a clear record, exceeding by 7,500 tons the previous heaviest aggregate, that of July.

The main trends governing the Command's intentions during the month were again:—

(a) The development of the strategic bombing of Germany, including attacks of direct assistance to the Russian armies on the northern sectors of the Eastern Front.

(b) The continuing attacks on German oil

production, stores and fuel dumps.

(c) The direct support of the Allied armies on the Western Front.

(d) The offensive against the flying bomb and rocket facilities.

Aircraft of Bomber Command flew on every day of the month of September and on twenty-four nights, but on five days and one of these nights the operations consisted of small routine patrols. Over 52,400 tons of bombs were dropped of which 21,000 tons fell on Germany. Day sorties again outnumbered night sorties, in the proportion of ten to six. Bomb tonnage by day amounted to 37,400 tons, and by night to 15,000 tons.

During the month the liberation of the greater part of France and Belgium enabled

the Command to concentrate much of its effort on objectives in Germany. There was a marked increase in the rate at which large areas of importance to the enemy's war industries and communications were devastated. In some instances German industrial and railway towns which had previously been attacked for strategic reasons became targets for tactical bombing. Earlier this year Frankfurt had been attacked several times because of its chemical and engineering industries, but on 12th/13th September it was heavily and successfully bombed because it had now become a most important supply base and centre of communications for the defence of Germany. Osnabruck and Munster were attacked on the 12th and 13th respectively for the same reason, and Emden was bombed in daylight on the 6th because it was the nearest base for the German navy when forced to leave the Channel ports.

Eleven specific rail targets were bombed on

seven other nights.

The rate of destruction of targets in Germany was also increased by the use of comparatively small forces bombing with such accuracy that as much damage was done as in much heavier attacks of the past. Almost the whole of Darmstadt, a centre of the enemy's chemical industries and a base for the German armies defending the Upper Rhineland, was destroyed by a force of little more than 200 Lancasters on the 11th/12th.

Damage on the heaviest scale was also caused in Kaiserslautern (27th/28th), Karlsruhe (26th/27th), Munchen - Gladbach (9th/10th, 19th/20th), and Bremerhaven (18th/19th); and heavy and successful attacks were made on Kiel (15th/16th), Stuttgart (12th/13th) and Neuss (23rd/24th) and the industrial suburb of Dusseldorf.

An unusual target was attacked on 23rd/24th—the aqueduct at Munster.

SECOND TACTICAL AIR FORCE AND A.D.G.B.

Aircraft of the 2nd Tactical Air Force and A.D.G.B. dropped nearly 5,000 tons of bombs (over 5,300 American tons) in offensive operations on the Normandy Front during June.

Over 10,000 sorties against land targets were made by the 2nd Tactical Air Force. A variety of targets were attacked, including communications on eighteen days and radio installations on thirteen days. Other objectives were enemy headquarters and transport, gun positions, coastal batteries, fuel and ammunition dumps and steelworks.

Patrols over the beachhead and the assault areas were maintained on every day, and in

addition offensive patrols were flown over a wide area.

In July aircraft of the 2nd Tactical Air Force and A.D.G.B. dropped some 4,400 tons of bombs in offensive operations over Northern France.

Rocket projectiles were also used extensively against a variety of targets during the month.

A.D.G.B.'s work during July was more varied than that of any other of the R.A.F. Commands. It provided, with the squadrons under its control, day and night cover for troops in Normandy and safeguarded supplies to them crossing the Channel.

It gave escort to Coastal Command aircraft on shipping strikes ranging from Brittany up to the Dutch Islands and in Norwegian waters. Although the Luftwaffe was not seen to come up on the majority of these operations there were occasions when dog-fights took place. The balance of destruction was greatly in favour of the A.D.G.B. Spitfire, Typhoon and Mustang squadrons.

Mosquito night intruders ranged over German airfields, bombing them and shooting them up with scarcely an encounter with a Nazi night fighter. The beach-head patrols had fewer combats as the month drew to a close, the Luftwaffe preferring to withdraw further inland.

On several occasions particular targets, obstructing our ground forces or of considerable value to the enemy, were the objectives of formations of Mosquito and Spitfire fighter-bombers. Buildings believed to be the head-quarters of Nazi staff were blown up, and in one particularly effective operation the small all-German village of Scrignac, in the Brest Peninsula, was devastated. The civilian population of Scrignac had previously been evicted by the Germans and a garrison of Nazi troops installed in their place.

The bombers gave a good account of themselves in combat with night fighters. During the month ninety-four enemy fighters were shot down.

Aircraft of the 2nd Tactical Air Force dropped some 5,000 tons during August in their close support of the Allied armies in France. More than 33,000 sorties were flown, nearly 10,000 of them by fighter-bombers and R.P. fighters. More than 4,000 transport vehicles, over 400 tanks and some 260 barges were claimed as destroyed.

Offensive day sorties during the month by A.D.G.B. topped the 3,000 mark and the number of night flights neared four figures—the majority over enemy occupied territory, despite the "Home Guard" function of the Command.

Many of the day missions were escort sorties in support of Bomber Command, but the defensive fighters carried out many offensive flights to strike at Nazi transport in support of the advancing liberation armies.

Highlight of the month's work was on 18th August when Polish Mustangs foiled the Luftwaffe's first bid to give large-scale support to the retreating Werhmacht by shooting down sixteen out of sixty Nazi fighters for the loss of one over Beauvais, where the German aircraft were assembling for a sortie.

Aircraft of the 2nd Tactical Air Force dropped over 3,000 tons during the month of September in their close support of the Allied armies in France. Much of the offensive work, however, was carried out by rocket-firing Typhoons who intervened with great effect at several stages in the Second Army's advance and in the taking of German garrisons.

Air Defence of Great Britain belied its name during September, for well over three-quarters of the sorties flown during the month were purely offensive. The removal in the early part of the month of a large part of the flying-bomb menace reduced even further the Command's defensive commitments. One group of A.D.G.B. flew more than 3,000 sorties over the Continent in one fortnight of September—this alone topping the Command's offensive sortie figure for the whole of the preceding month.

Much ground strafing work was undertaken by the Command and in this dangerous work thirty-five day and six night fighters were lost. The aircraft losses however do not reflect personnel losses, for some of the pilots were saved either from the sea or from aircraft which crashlanded on Continental soil.

A.D.G.B.'s outstanding task in September was to assist in paving the way for the airborne invasion of Holland, several hundred sorties being flown before and during the operation to destroy enemy gun positions, disrupt transport and communications and generally spread chaos and destruction in the Nazi lines.

Not the least of the Command's tasks was assistance with air/sea rescue work during this invasion, and on the peak day more than 100 lives were saved from the Channel.

The Command continued to operate with success against flying bombs, although very greatly reduced numbers were launched during September.

Tempests, Mosquitos and Mustangs were used for many long-range offensive patrols, a large number penetrating Germany itself, and several Nazi airfields were attacked. Spitfires too were kept busy with escort missions to

Bomber Command penetrations, some of them at extremely long range.

The Luftwaffe gave A.D.G.B. fighter pilots no trouble and Nazi aircraft had to be searched for and have combat forced upon them despite evidence of the employment of increasing numbers of jet fighters.

U-BOATS AND SHIPPING

Aircraft of Coastal Command flew nearly 8,000 sorties during June, and on every day. This total is double that of the previous month and treble that of June, 1943.

Nearly 3,000 sorties were flown on reconnaissance and photographic reconnaissance alone. Anti-submarine patrols were carried out on every day and attacks on shipping were made on twenty-eight days. In all, a total of over 600 vessels of all types were attacked by aircraft of Coastal Command. Convoys were escorted on eleven days.

Aircraft of West Africa Command flew antisubmarine patrols on twenty-two days, and shipping escort duties on twenty days.

Aircraft of R.A.F. Coastal Command flew approximately 6,000 sorties from home bases during July. Anti-U-boat and reconnaissance duties were performed continuously throughout the period. On anti-U-boat operations alone aircraft of this Command from all bases put in well in excess of 30,000 flying hours.

Nearly 2,000 anti-shipping sorties by Coastal aircraft were flown and some 550 individual attacks were made. The number of vessels attacked was approximately 225.

Bomber Command made an attack on the port area of Le Havre and naval vessels there in daylight in the evening of the 31st.

Mines were laid in enemy waters by Bomber Command aircraft on twenty-four nights.

Aircraft of West Africa Command flew on anti-submarine and escort duties on twenty-five days.

Aircraft of R.A.F. Coastal Command were again in continuous operation throughout the month of August on anti-U-boat and reconnaissance duties. Well over 30,000 flying hours were again put in by aircrews of the Command in anti-U-boat patrols alone.

Coastal Command aircraft flew over 1,700 anti-shipping sorties during the month and more than 260 targets, ranging from single ships to convoys, were attacked.

In the Mediterranean some 250 ships were attacked by R.A.F. aircraft.

Enemy held and North German ports were special targets for R.A.F. Bomber Command during the month. Apart from the heavy attacks on such ports in Germany as Stettin, Kiel and Bremen R.A.F. bombers made eighteen daylight attacks on thirteen days on enemy occupied ports in France, including U-boat pens and shipping therein.

The sea-mining by R.A.F. Bomber Command was also one of the heaviest and most wide-spread of the war. The waters mined included the Dortmund-Ems and the Stettin ship canals. Bombers made weather reconnaissances on twenty-five days and twelve nights.

Aircraft of West Africa Command flew antisubmarine patrols on twenty-six days, and escorted shipping on twenty-eight days.

Aircraft of R.A.F. Coastal Command were again in continuous operation throughout September on anti-U-boat and reconnaissance duties. More than 3,000 sorties, involving some 27,000 flying hours, were made by air crews of the Command on anti-U-boat patrols.

The number of sorties from home bases by the Command was more than twice the total for October, 1943.

Aircraft of West Africa Command flew antisubmarine patrols on twenty-eight days and escorted shipping on twenty-two days.

Sea-mining by aircraft of R.A.F. Bomber Command was carried out on six nights.

Coastal Command aircraft flew over 1,700 anti-shipping sorties, involving over 6,000 hours flying time. More than 180 targets, ranging from single vessels to convoys, were attacked.

On 15th September, Lancasters of Bomber Command successfully attacked, without loss, and without fighter cover, the battleship *Tirpitz*, which still constituted a menace to Allied shipping as a potential commerce raider.

R.A.F. TRANSPORT COMMAND

In addition to maintaining the regular trunk services according to schedule, R.A.F. Transport Command flew in supplies to all fronts during June.

Services covering the American coast from Newfoundland to Natal, the several trans-Atlantic routes, trunk routes from the United Kingdom, Middle East, Africa and India were continued regularly. More than three-quarters of a million miles were flown across the Atlantic and a steady flow of reinforcement aircraft was kept going to Africa and India.

In Burma one group of Transport Command maintained the service of supply to the forward troops, evacuating casualties on the return journey.

The same was happening in Italy and in Normandy.

Prior to the landings in Normandy aircraft of a Transport Command group based in Great Britain dropped leaflets in the area chosen for attack, and just before invasion started carried some thousands of paratroops and glider-borne troops to their objective in the Caen area. Stores for their immediate needs were dropped at the same time, including jeeps, trailers, handcarts, bicycles and motor-cycles, anti-tank guns, medical supplies and ammunition.

After the first attacking force had been delivered, the transport aircraft continued with air supply and maintenance, transferring to Normandy the personnel and kit of several R.A.F. Wings, which meant lifting some 2,000 people.

Equipment and supplies delivered included a large number of 500 lb. bombs, more jeeps, wireless equipment, propellers and spare parts. The medical stores carried included consignments of penicillin, blood plasma, whole blood and ether. As much as a ton of blood plasma was carried in one day.

On the return journey immediately a landing strip had been completed, Transport Command commenced the air evacuation. To date more than 3,000 men had been carried home for hospital treatment. The first aircraft to land and take off from a landing-strip in Normandy was a Transport Command aircraft of the Air Delivery Letter Service.

While maintaining its regular trunk services over much of the earth's surface, R.A.F. Transport Command during the month of July played a big part in the transport of supplies to battle fronts, in the carrying of mail and in the evacuation of casualties, particularly to and from the Normandy front.

Throughout July approximately 550 tons of raw material, medical supplies and food were flown from the U.K. to Normandy. Nearly a thousand personnel of the fighting and medical services were taken over, together with their baggage and 500 other passengers, and more than 2,000 lb. of mail were taken each day between Normandy and Britain.

In addition, during July several thousand casualties were successfully evacuated to the U.K., making a total of over 10,000 since D Day.

Newspapers for the troops' comfort and other things were also taken over.

It is worthy of note that not a single aircraft was lost or suffered mishap while carrying casualty cases and not a single casualty died on the journey.

Outstanding among R.A.F. Transport Command's activities in August were the great increase in the number of casualties evacuated from France, increased loads carried to the battle areas and the ferrying of thousands of pounds of foodstuffs for the relief of the people of Paris.

During the month the 20,000th casualty evacuation figure since D-Day was reached and passed, again not one aircraft suffering mishap. Several hundred tons of urgent supplies were carried to Normandy, including an average of two tons of mail each way a day. One group of Transport Command conveyed 167 tons of food for Paris in one day.

Transport Command aircraft carried several distinguished passengers on important missions, including His Majesty the King and the Prime Minister to Italy and back, and Lord Beaverbrook on the return trip from Washington. The Lord Privy Seal's flight was outstanding. The aircraft was the famous Liberator "Commando," which flew Mr. Winston Churchill to the historic Teheran Conference, and it covered the 3,460 miles from Washington to London non-stop in 17 hours and 37 minutes.

Throughout the month the Command maintained its global activities and losses continued to diminish to well below the half of one per cent. figure.

During September R.A.F. Transport Command was more actively engaged in front-line work than ever before in its history.

Thousands of airborne troops were dropped in the area of Nijmegen, Grave and Arnhem bridges—a hazardous operational task carried out in face of fierce enemy fire and constant interception from German fighter aircraft. The speeds of the unarmed Dakotas were slowed down to little more than 100 miles an hour by the gliders they towed, and evasive action was not possible. Losses on the subsequent supply-dropping operations were inevitably heavy, for, by that time the enemy was able to concentrate his anti-aircraft defences and fighter formations.

Despite all the opposition, the vast majority of supplies were dropped on prearranged areas, and in little more than a week the R.A.F. Transport Command group concerned in the supply mission made more than 500 sorties.

Another outstanding event of the month was the resumption of a regular daily service between London and Paris for military, naval and R.A.F. traffic. Daily contact with Belgium was also maintained.

The 30,000th casualty to be brought by air by the Command to the United Kingdom from the battlefield was carried during the month. A third of the casualties evacuated by Transport Command aircraft were members of the U.S. armed forces.

Outside the European theatre of operations a Transport Command "York" made history by completing a round trip from England to India and back in fifty-one hours' flying time. The overall time, including servicing at Karachi, was 65 hours 23 minutes.

ENEMY ACTION AGAINST THIS COUNTRY

Enemy action against this country in June was carried out mainly by means of flying bombs. Counter measures against the flying bombs were carried out by Bomber Command and 2nd Tactical Air Force in offensive operations, and by Air Defence of Great Britain in defensive.

Bomber Command attacked a number of flying-bomb sites and military installations during the month.

Aircraft of the 2nd Tactical Air Force also made a number of attacks on these objectives, and Air Defence of Great Britain kept up a constant watch on flying bombs crossing the coast, in collaboration with Anti-Aircraft Command.

The major attention of A.D.G.B. and antiaircraft guns and balloons operating under its control, were directed to destroying the flying bombs which the Luftwaffe were now sending instead of the bombers it once used, and a considerable toll was taken of these missiles during July.

R.A.F. Bomber Command's offensive against the flying-bomb launching sites and the constructions believed to be connected with long-range rockets and the supply and storage depots for these weapons was heavy and sustained during the month. Attacks were made on twenty-three days and thirteen nights.

The harassing attacks on the flying-bomb launching sites were made whenever weather conditions permitted. Complete precision was needed in dealing with such well-hidden and flexibly disposed targets. The enemy's bombardment was without doubt appreciably hindered by these harassing attacks.

Flying-bomb supply depots, which are often housed in caves, tunnels or quarries, were attacked in strength on several occasions. In the attack on the depot in the caves at St. Leu d'Esserent on 7th/8th more than 1,000 tons of bombs were dropped and on the depot at Nucourt on 15th/16th 800 tons. By daylight the large flying-bomb depot in the caves at Thiverny was bombed with more than 500 tons on the 19th.

The large concrete structures which appeared to be connected with the enemy's threatened long-range rocket assaults called for a special method of attack, including the use of 12,000-lb. bombs. Reconnaissance confirmed the effectiveness of these "earthquake" bombs in attacking these formidable concrete constructions. In the Pas de Calais attack on the 6th some 1,500 tons of bombs were dropped on one of these installations. An attack of more than 500 tons was made on a supply depot hidden in a wood near Watten on the 28th.

No attacks by enemy aircraft on targets in this country were reported during the month.

One enemy bomber flew over this country during August. It made a brief appearance over South-East England on the night of 22nd/23rd and was shot down.

The flying-bomb bombardment of Southern England, including the London area, was continued, but tended to become spasmodic during the latter part of the month. There were several lulls in the attack, including one of thirty hours. Fighters, anti-aircraft guns and balloons continued to take toll of the missiles.

R.A.F. Bomber Command maintained its offensive against the launching sites for the flying bombs, the installations believed to be connected with possible rocket attacks and various supply and storage depots. Launching sites were bombed on ten days and two nights, and other installations on ten days and four nights.

The heaviest attack of the month was on the supply centre at Trossy St. Maximin on the 3rd, when more than 2,000 tons of bombs were discharged.

No bombers operated against this country during September.

Daylight launchings of flying bombs only occurred intermittently in the first few days of the month. During the second half of the month a few flying bombs crossed the coast on most nights. Three Heinkel III's used for launching the missiles from the air were shot down during the last three weeks of the month.

AIRCRAFT CASUAL	TIES—JAN	IUARY 1	ro SEP7	TEMBER	L	
	Over Europe*	Over G.B.	M.B.	Italy.	S.E. Asia.	Totale.
Enemy aircraft destroyed: January	. 93	30	7	375	39	544
February	. 51	55	20	385	14	525
March	. 41	59	12	279	107	498
Totals First Quarter	. 185	144	39	1,039	160	1,567
R.A.F. and Allied: January		0	9	107	17	518
February	. 245	0	26	152	23	446
March	. 351	0	11	177	34	573
Totals First Quarter	. 981	0	46	436	74	1,537
Enemy aircraft destroyed: April	63	45	2	607	36	75 3
May	. 86	2 9	1	433	59	608
June	. 25†	7	7	460	8	501
Totals Second Quarter	174	81	10	1,500	103	1,862
R.A.F. and Allied: April		1	12	286	33	591
May		0	3	385	25	801
June	. 181†	0	16	373	13	583
Totals Second Quarter	828	1	31	1,044	71	1,975
Enemy aircraft destroyed: July	. 51†	3	5	658	12	729
August	. 5†	1	1	295	2	304
September	. 11†	4	13	39	2	69
Totals Third Quarter	. 67	8	19	992	16	1,102
R.A.F. and Allied: July		0	10	475	20	726
August	228†	0	6	477	17	698
September	130†	0	1	279	16	426
Totals Third Quarter	579	0	17	1,201	53	1,850

* Excludes U.S. claims and losses.

Transport Command Delivery

A IRCRAFT of R.A.F. Transport Command, manned by British and Dominion crews, are constantly at work taking essential supplies to forward units of the British and Indian armies in Burma.

To do so they must cross high mountain ranges and dense jungle. Air transport is the lifeline of these front-line troops, and many times there has been tense drama behind the flights.

On return journeys the aircraft carry casualties to hospital, 200 miles from the Front.

Such aircraft fed and maintained the Wingate Expedition and evacuated their wounded, setting their aircraft down within enemy range to take them aboard. During an operation from a Bengal airfield "P for Peter," one of the many aircraft engaged, flew a typical load, which included 47,000 cigarettes, 6,000 boxes of matches, tinned milk, biscuits, cooking-oil, salt, beans and peas, oatmeal, sugar, tea, medical supplies, solidi-

fied fuel, tommy cookers, jam, cheese, curry powder and onions.

"P for Peter," with the entire squadron of fully-laden, fast transports taxied out to the end of the runway, led by the flight commander, and in less than a minute all the aircraft were airborne and heading for the front line outpost that was their objective.

"Seen from 'P for Peter,'" an observer said, "they made a grand sight on our port and starboard sides, their combined slipstream shooting a violent duststorm towards the hangars.

"Our pilot, a 23-year-old flight lieutenant from Winnipeg, was an enginering student in civil life and perfected his navigation as captain of a Coastal Command Hudson. We took our place in the last 'vic' at 8,000 feet.

"We were well above the clouds and the fierce sun made the interior of the aircraft too hot for comfort. After flying for two hours we were met

[†] Excludes all operations connected with the campaign in Normandy.

by a squadron of Hurricanes which escorted us

to our dropping point."

Until recently, supply-dropping aircraft did their flights alone and unarmed, trusting to cloud cover and low flying in the winding valleys. But, an important has their work become that they now have fighter escorts.

"We were over rugged, desolate country," continced the observer. "As far as the eye could see, hills up to 3,000 feet zig-zagged awkwardly over the horizon. We were well within range of enemy fighters. The jungle beneath, a densely vegetated maze of green sprawling between the valleys, was no place for a forced landing.

"We broke formation and descended, to fly in line astern, playing follow-my-leader through valleys and skimming hilltops and rivers until our formation leader circled a hill, eight miles far-

ther on.

"Parachutes from the first two aircraft had already landed right where the troops waited for them. Our turn came, and we made our run.

"I sat in the co-pilot's seat, and watched the crew in the fuselage, stripped and sweating, as they piled the heavy packages at the exit, ready for the next run. They worked like coolies.

"Five packs were poised ready, with another five directly behind. They weighed from 80 to 140 lb. each. The contents were packed in tins with a small parachute on top, enclosed in a cover with 12 feet of rope fastened to an attachment inside the aircraft. The crew were secured by safety belts tied to a longeron.

"'Red light on,' shouted the flight sergeant near the tail, and the crew got their hands under the packages. The bell rang insistently and everybody heaved like mad to get thirteen packages overboard before the bell rang again, three sec-

onds later.

"The process was repeated until the last package had been dropped, and we circled to make sure that the load had landed safely, before set-

ting course for base.

"But 'P for Peter' had not finished the mission. A radio message ordered us to land at a forward airfield, to fly six urgent casualty cases back to base. We set course south, escorted by Hurricanes, two flying close in to ward off any possible hit-and-run attack, while the four others

criss-crossed in and out of the clouds, searching for enemy fighters which might have looked on 'P for Peter' as easy meat.

"Below, we saw the landing strip, deserted save for its small wind sock hanging from a bamboo pole. We touched down to pick up our cargo and left the Hurricanes patrolling the sky.

"Eight stretcher cases came aboard, mostly Gurkhas, but there was one British soldier among them, a private from Tutshill, Monmouthshire.

"I asked him what had happened. He pointed south, where smoke from mortar-fire and shells showed as they burst in the sky. 'We ran into a machine-gun burst,' he said. 'We were accompanied by Gurkhas, and trying to edge round a Japanese pimple (a small concentration, heavily armed with machine guns). Johnny Jap must have seen us as we were coming through the trees, and they outnumbered us four to one. The scrap didn't last long, and when it was over the stretcher-bearers came out to help get back the wounded. We were sneaking back when the Japanese opened fire and many of the stretcher cases already wounded were killed, along with the orderlies.' He swore vehemently.

"When all the patients were comfortable, we took off and rejoined the waiting fighter escort, to set course for base, where ambulances were

ready to rush the wounded to hospital."

Transport squadrons meet strange demands. One came from an officer in charge of locally raised native levies in a North Burma fastness. They were armed with their most treasured possessions—ancient flintlock muskets—and they wanted black powder and lead to make their own bullets. Supplies were flown to them.

Bicycles were parachuted to one unit, while another got a surprise wireless set. It was dropped by mistake, and was intended for the troops at

the dispatch centre.

The dispatching base is busy from dawn to dusk, and well into the night, preparing stores of British and Indian food. Small arms and ammunition, medical supplies, bedding and warm clothing are all sent this way, and without instant transport aircraft forward positions could be supplied only with tremendous difficulty.

The supply-dropping squadrons are, in fact,

the mercy bombers of the R.A.F.

Medical Role of R.A.F. Transport Command

A.F. Transport Command activities are now world wide, carrying freight and passengers on trunk routes and to all operational theatres. In view of this our R.A.F. medical services have not been slow to take full advan-

tage of these services.

Transport aircraft are of inestimable value for carrying to inaccessible places foodstuffs necessary for health, such as green vegetables and fresh meat. They also carry blood and urgent

medical stores over distances where rail and sea transport would be too slow.

One of the most valuable life-saving uses of transport aircraft is the evacuation of casualties. Patients have been carried by air from the earliest days of aviation. In this war, small-scale air evacuation was carried out in the Iraq rebellion, when Habbaniya was surrounded and patients were evacuated by old Vickers Valentia troopcarriers, which took off from no-man's land under the guns of the rebels just before dawn each day.

Air evacuation of casualties was also used in the Syrian campaign, but its large-scale use was developed in the Western Desert.

In the early stages, air ambulances marked with the Red Cross of Geneva, and supplied by Australia and the Union of South Africa, were employed. These aircraft worked together as a team, under the control of the commanding officer, "No. 1 Australian Air Ambulance Unit." This unit evacuated many thousands of casualties and sick from the battle areas, and operated with the 8th Army into Italy.

In the Western Desert they flew to and from forward areas and, when Sicily was invaded, during the battle of the beaches these aircraft again went in to collect 8th Army casualties.

But the "Air Ambulance" proper carried only a small proportion of the casualties in the Western Desert, Sicily and Italy. The larger transport aircraft, flying longer distances and at greater speeds, performed the bulk of the work.

Air transports, taking personnel and freight to the forward battle areas might often return empty and the R.A.F. medical services took advantage of this. In conjunction with the Army medical authorities, they arranged a system whereby loads of casualties were always ready for the transport aircraft arriving in forward areas with their passengers and freight. No transport aircraft was allowed to return empty.

Over 10,000 casualties and sick were evacuated by Royal Air Force transport aircraft between El Alamein and Tunis, and in all, during 1943, Transport Command aircraft carried over 16,000 sick and wounded for treatment at base hospitals.

Aircraft no longer seek the protection of the Geneva Red Cross so that they may be free to carry ordinary passengers and freight, and so every aircraft used by Transport Command can be equipped for the carriage of casualties. On its journey to an operational theatre it will carry food and war materials. For its return trip, it can be rapidly converted to an air ambulance, with stretchers carried on neat racks, which take

American as well as British stretchers. A nursing attendant with full facilities to attend to the requirements of all the patients is also carried.

However, owing to the risks of enemy activity and bad weather, air evacuation of casualties cannot always be relied upon and the older system of evacuation by road, rail and sea is therefore maintained.

If enemy air opposition is strong, the Royal Air Force commander in the field will forbid the use of transport aircraft unless he can afford fighter cover, so reducing the risk of these aircraft being shot down when they are carrying sick and wounded.

The advantages of air evacuation of casualties are indeed great. For instance, the soldier, injured in the front line, is transported to the base hospital where specialist facilities exist, in the shortest possible time. Another great advantage is that air evacuation of casualties frees the main road and rail facilities on the Army lines of communication from the extra burden of returning road ambulances and hospital trains, thus allowing quicker transit of troops and urgent war materials to the front line. Again, the number of medical personnel and ambulance drivers employed on casualty evacuation is materially cut down.

In tropical areas, where the lines of communication may run through jungles and swamps, and disease incidence is extremely high, the evacuation of casualties by air saves them from the extra risk of malaria and other diseases which are prevalent.

Finally, the moral factor is extremely important, and experience has shown that the soldier going into battle is greatly comforted to know that if he is wounded he will have a quick and comfortable trip back to base.

To ensure that the facilities are fully utilized, Transport Command have placed medical units, trained in all problems of casualty air evacuation, at all the important termini of trunk routes throughout the world. They also have specialized mobile units which go forward with the Army in operational theatres. These are known as "casualty air evacuation sections" and are equipped to house and feed casualties awaiting air evacuation, as well as rendering any necessary medical attention.

The R.A.F. medical services have more than a thousand R.A.F. and W.A.A.F. nursing orderlies trained in air ambulance duties. It is interesting to note that the W.A.A.F. have volunteered in equal numbers to the men.

History of R.A.F. Hospital from El Alamein to Italy

HE latest patients of a R.A.F. mobile field hospital now in Italy, in which 2,000 surgical operations have been carried out since El Alamein, are several Italian children injured by German mines as they played in fields and woods. One of the hospital's first casualties, on arrival from the desert, was an Italian child who had a hand blown off by a German booby trap while plucking grapes.

Since August, 1940, the hospital, which is attached to the Desert Air Force, has been healing not only sick and injured airmen, but all Allied and enemy soldiers who needed medical attention. The work of its staff and the widespread medical treatment given is typical of the thoroughness of the R.A.F. medical service.

The hospital, which has a well-equipped operating theatre, has occupied forty different sites since El Alamein and only twice during the past three years has been accommodated in buildings, nearly all its work having been done under canvas.

One of its enemy patients was a German who dropped bombs in the hospital grounds at Benghazi and found himself a few minutes later receiving treatment for second degree burns. Shot down by a Beaufighter, he had baled out of his burning aircraft. He protested that on his map the hospital was shown as a warehouse.

Fuka, Tobruk, Sidi Rezegh, Mersa Matruh, Tripoli, Medennine, Gabes and Tunis—this R.A.F. mobile field hospital has been at all these places and many others besides. The main hospital was operating in tents at Sabratha, Libya, in July, 1943, when its advanced surgical section was in Malta standing by for the invasion of Sicily. Here the operating theatre was set up in a cave for safety, while at Pachino, en route to Comise, Sicily, the advance party were subjected to enemy air attack and shell-fire.

A shell penetrated the surgical ward and wounded—although not seriously—the resuscitation orderly and a Canadian patient who was being treated. Some of the beds were riddled with shell splinters.

In the Catania Plain the hospital looked after injured air crews of both fighter and medium-bomber wings, and after landing in Italy, served two American fighter groups and a South African wing. Eventually it served all R.A.F. units in Southern Sicily.

The hospital's equipment has been augmented by captured Axis supplies, including a 32-seater

bus and an ambulance. It has surgical equipment and specialized electrical appliances, normally only available in a large hospital, including an operating theatre electrical panel into which can be plugged various appliances ranging from an Aldis lamp to a diathermy. The operating table is floodlit by two lamps captured from the enemy at Tobruk. Some of its most useful electrical gadgets are the result of the inventive resource of one of the operating-room assistants.

The operating theatre has seen many dramas. Once an Indian soldier was undergoing a major operation, and while it proceeded the greater part of the theatre had to be dismantled and packed for the road, in a race against the advance of a German Panzer division. The operation was successful and tents and equipment were packed up and whisked away just before the enemy arrived on the scene.

Mobility has become a fine art with the hospital and it is able to pack everything, travel 100 miles if need be, and be ready for action on the same day at its new site.

While in the desert one of the problems was ensuring a supply of fresh water. Sometimes on arrival at the water point it was found that the Germans had made it unusable by putting dead camels in the well. Another snag was presented by sandstorms. At times it was necessary to tie guy ropes to vehicles to keep the tents up.

When a train carrying Egyptians was bombed by the Germans, the hospital—then in the Middle East—rendered prompt aid to the injured passengers although some of the ward lights had been extinguished by the blast. King Farouk of Egypt later wrote to the hospital thanking the staff for the excellent treatment given to his subjects.

The hospital possesses a well-equipped "lab" wagon built on a three-ton truck designed by Cpl. H. Harding, of Warrington, laboratory assistant, who before the war was on the staff of Lancashire County Hospital. His assistant is L.A.C. H. Skiffington, of Heswall, Cheshire.

Among diseases treated, malaria and jaundice have predominated.

The ambulance men are ready for the call at all times, and even the Christmas party was interrupted by a call at midnight to a road accident nine miles from the site.

Squadron Leader Brian Eaton, D.F.C., commanding officer of a famous Australian Kitty-

hawk squadron, was brought to the hospital with a wrist wound. His arm was put in plaster-ofparis, and he was declared unfit for flying duties. Anxious to be back on the job again, Squadron Leader Eaton adapted his aircraft to suit his dis-

ability and a week after his discharge from hospital he won the D.F.C.

The hospital's surgeon has—in the words of the commanding officer—"done a colossal job of life-saving surgery."

The Guild of Air Pilots and Air Navigators of the British Empire

WHAT IT OFFERS TO THE ROYAL AIR FORCE
PILOT

THE Guild was formed in 1929 by professional air pilots to care for the interests of all commercial pilots and navigators. The affairs of the Guild are managed by a court of twenty elected members.

The Guild acts as a link between pilots and navigators and (1) the Air Ministry, (2) the Central Medical Board, (3) aircraft operators, (4) the Society of British Aircraft Constructors, (5) the Royal Aeronautical Society, (6) the Royal Aero Club, (7) House of Commons, and (8) the established City Companies, and is recognized by all these bodies as an organization which not only helps the professional aviator but one that can put forward sound and constructive ideas and suggestions for the general advancement and benefit of civil aviation. It has frequently been consulted by the Air Ministry when new rules and regulations were contemplated, and its views have always been given careful consideration by Government Departments. An example of this was the recognition some years before the war of the need for flying instructors to be properly qualified. The examination for instructors was entrusted by the Air Ministry to the Guild, who organized a panel composed of senior flying instructors to carry out the tests. As this was done by the pilots and for the pilots the minimum delay and expense was involved and all assistance was given to the candidates.

The Guild is not a Trade Union and does not seek to become one. That side, *i.e.*, the industrial side of the pilots' and navigators' lives it leaves to the British Air Line Pilots Association, with whom it works in close co-operation.

The Guild's activities are in maintaining a high standard of professional skill, a high standard of safety, and preventing any infringement of air regulations. Only by maintaining these high standards can Civil Aviation prosper and extend.

The educational facilities required by members of aircrew can be provided or arranged for by the Guild, and in this connection it can offer useful assistance to the Royal Air Force pilot who wishes to make civil aviation his career.

The medical standards for aircrew are carefully considered by the Guild, and the honorary medical advisors have enabled the Guild on several occasions to assist its members who were in difficulties with the Central Medical Board.

The employment bureau will be reopened as soon as the European war ceases and should again be of help to all members. Meanwhile the Guild have arranged to keep a record of the experience and history of individuals who hope to occupy positions of responsibility in civil aviation after the war, and a form for this purpose will be supplied on request to anyone desirous of taking advantage of this.

While membership of the Guild or B.A.L.P.A. cannot guarantee any pilot in the R.A.F. a job in civil aviation, all who wish to enter civil aviation after the war are strongly urged to join both bodies. It is only by a large and live membership that either body can obtain the influence necessary to protect the pilots' various interests. The post-war jobs will go to the highly qualified, and continuous study of the art is the only sure means of success.

The normal annual subscription is £3 3s., but members of the Services who intend to take up civil aviation as a career after the war are eligible for temporary associate membership at an annual subscription of £1 1s. The address of the G.A.P.A.N. is 4, Hamilton Place, London, W.1.

The address of the B.A.L.P.A. is No. 7 Park Lane, London, W.1, and the subscription for membership with that body is £2 2s. a year.

Attack on the Amiens Prison: An Epic R.A.F. Operation

[See page xv]

"MOSQUITOS are to attack the prison at Amiens in an attempt to assist more than 100 prisoners to escape. These prisoners are French patriots condemned to death for assisting the Allies."

This was the briefing one day of air crews at an Allied Expeditionary Air Force intelligence room, and it was the prelude to an epic operation by the Royal Air Force. For security reasons it has not been possible until now to

give a full account of the exploit.

Frenchmen were lying in the jail awaiting death for their brave efforts in the Allied cause. Some of them had been condemned for assisting Allied airmen to escape after they had been brought down in France. It was clear that nothing less than a successful operation by the R.A.F. to break down the prison walls—even at the risk of killing some of the patriots they wished to rescue—would afford these men any reasonable prospect of escape.

The R.A.F. undertook this exacting task, accepted the risk of killing people who, in any event, were to be put to death by the enemy, and eventually learned that as a result of their attack on the jail, many prisoners escaped and considerable casualties were caused among the

German guards.

The prison was a cruciform building in a courtyard, surrounded by a 20 ft. high wall, some 3 ft. thick. The yard was fenced internally to segregate the prisoners while they were at exercise. Accuracy in attack was regarded as essential, for whereas on the one hand the walls and buildings required to be breached, on the other, in order to reduce casualties to a minimum, it was important that the least possible force should be used.

The jail was guarded by German troops living in a special wing, the location of which was exactly known. The attack had to be sufficiently discriminating to ensure that decisive force was used against this part of the building. The time factor, too, was important, for the escaping men were to receive valuable assistance by patriots from outside if these patriots could be warned of the exact time of attack.

The task, therefore, called for secret and detailed planning, and a model of the prison and its surroundings was made from photographs and other information already in the Air Ministry's possession. Thus, in planning and briefing every aspect was studied.

To carry out this exceptional operation, the task was entrusted to a Mosquito wing of the

R.A.F. Second Tactical Air Force comprising British, Australian and New Zealand squadrons, and including R.C.A.F. airmen, commanded by Group Captain P. C. Pickard, D.S.O. and two bars, D.F.C., one of the most outstanding and experienced bomber pilots in the R.A.F.

It was decided to allocate two fighter squadrons for escort duties, from a fighter group that played a memorable part in the Battle of Britain.

The task added to the many difficult and daring operations which the Mosquitos of the Second Tactical Air Force have performed—operations which have included the destruction of the single-building German Headquarters of Civil Administration in the centre of the Hague, numerous enemy army barracks or chateaux converted for occupation by German troops in France, German army headquarters in the field, electric power stations and other targets which demanded the most exacting precision attacks.

Of all these operations, however, the Mosquito aircrews counted as the most intricate the action against the Amiens prison on 18th February, 1944. On the morning of that day the aircrews rose before dawn for their very careful briefing, to find the airfield covered with snow and low cloud, and with little prospect of clearance.

Once the plan was outlined, the crews, the most experienced from each squadron, were determined to press home their attack in spite of the adverse weather. It was obvious that the prison walls must be broken in at least two places to enable any escape whatever to be made. At the same time, both ends of the main building had to be hit to release the prisoners from their confinement. Accordingly, the first wave of six aircraft was detailed to breach the wall, on its north-east and north-west perimeter. The second wave of six aircraft was to divide and open up both ends of the jail, and to destroy the German guards' quarters. A third wave was available should any part of the plan miscarry.

To obtain the accuracy required it was necessary to bomb from "deck-level" and each wave had to be so timed that the results were achieved in their right sequence and to avoid casualties by collision over such a small target. A Mosquito was allotted to the operation to make film and photograph records of the attack.

It was an hour before midday when the

squadrons left their snow-covered airfield to rendezvous with their fighter escort on the south coast of England. From there the formation flew at sea-level to the French coast, swept round the north of Amiens and approached their objective along the straight Amiens—Albert road on which the prison is located. The second wave, on approaching the target, saw that the first wave had been successful.

Through the dust and smoke of the bombing the corners of the jail were seen, enabling an accurate attack to be made. This, too, was so successful that Group Captain Pickard, circling the target, was able to send the third wave home without any necessity for its attack. The photographic Mosquito, making three runs over the objective, saw the breaches in the wall, the ends of the building broken, prisoners running out through the breaches, Germans lying on the ground and, on the last run, some patriots disappearing across the snow on the field outside the prison.

The operation was not completed without losses, however, for two Mosquitos, one of which carried Group Captain Pickard and his navigator, Flight Lieutenant J. A. Broadley, D.S.O., D.F.C., D.F.M., of Richmond, Yorkshire, were shot down by enemy fighters, as also were two of the fighter escort. Saddened as the were by this loss of their leader and other colleagues, the aircrews who took part in the operation felt that the sacrifices had not been in vain when it became known that a high percentage of patriots had escaped. Although, as was unavoidable, some of the patriots were killed by German machine guns as well as by bombs, it is known that the Germans themselves suffered casualties from the attack.

Since the successful liberation of France and subsequent relief of Amiens by the Allies, it has been possible to collect certain details, particularly of our losses, which had hitherto been unobtainable. All that was originally known of Group Captain Pickard's fate was that his aircraft was last seen circling over the prison slightly above the height at which the three waves of Mosquitos were attacking.

His purpose was to decide whether or not sufficient force and accuracy had been achieved by the first two waves and to order the reserve wave to attack or withdraw accordingly. It was for this reason that he had detached himself from the main formations to a position from which, though it was dangerous, he could best see and direct the operations.

It now seems certain that when he had ordered the last wave to withdraw without dropping its bombs, he saw one of his Mosquitos brought down by the fierce light flak put up by the German defences. Determined to investigate the crash, to discover the fate of the crew, he himself was "bounced" by a pair of F.W. 190's sent up to intercept our aircraft. Caught thus pre-occupied, and detached from the friendly fighter escort, which by then was covering the withdrawal of the main formations, he fell a victim to the enemy fighters.

He was shot down a few miles from Amiens and his body, with that of his navigator, was subsequently recovered by friendly villagers, who had seen the whole action. The Germans forced the villagers to hand over the bodies but were unable to prevent them attending the burial in the cemetery alongside Amiens prison.

As soon as his comrades reached Amiens after the invasion, seeking news of the aircrews' fate, the villagers presented them with photographs of the graves and a few personal belongings which they had secreted from the Germans for the months before the invasion in order that his identity and that of his navigator might be established.

Tragic though Group Captain Pickard's loss is, there is consolation in the knowledge that it occurred while he was leading the most successful operation of his gallant and brilliant career.

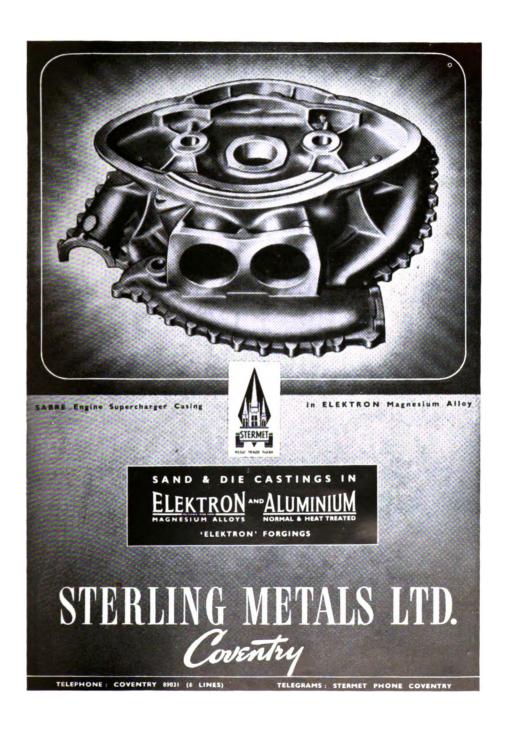
The attack on Amiens prison will remain one of the most memorable achievements of the Royal Air Force.

Art

Prizes to the value of fifteen pounds are offered quarterly for sketches, drawings and paintings having a service or aeronautical flavour, straight or humorous, and finally accepted for publication in this Journal. The number to be accepted for publication each quarter will not exceed four.

Entries must be sent by registered post, addressed to THE EDITOR, R.A.F. QUARTERLY, c/o GALE & POLDEN LTD., Ideal House, Argyll Street, Oxford Circus, London, W.1, and must be received by the first day of each month (i.e., 1st February, May, August, November) preceding the month of publication.

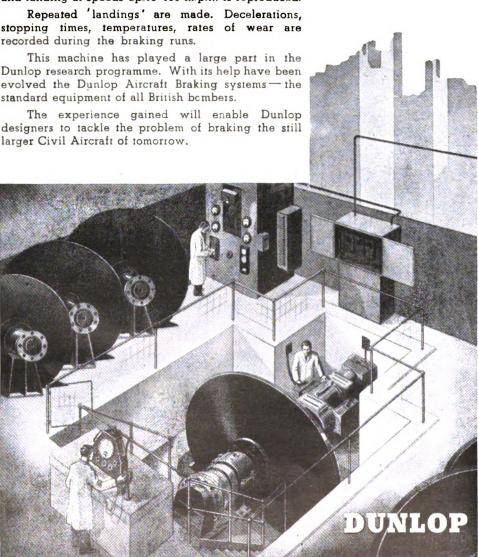
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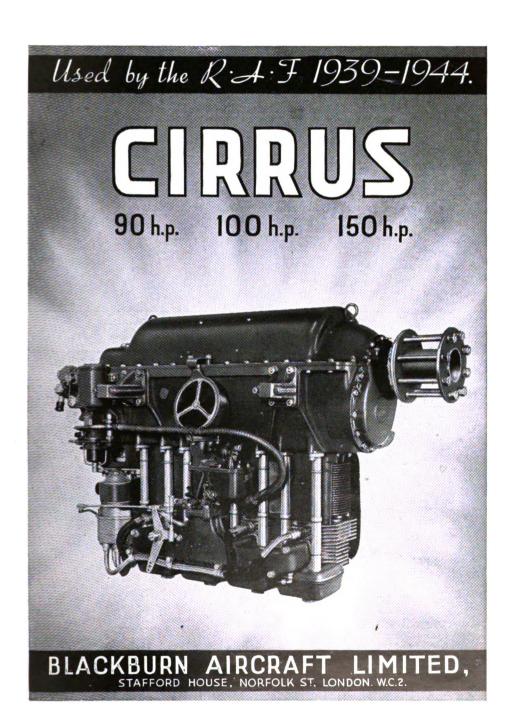
Braking records in the laboratory . . .

Dunlop engineers have evolved a testing machine, whereby the braking systems of the heaviest aircraft can be tried out in the laboratory under the most arduous working conditions.

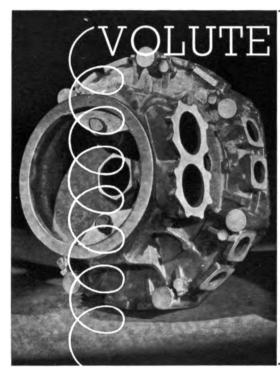
The illustration shows a range of fly wheels, one of which is fitted to the test machine, depending upon the size of brake to be tested. By using the largest size the kinetic energy (40,000,000 ft. lb.) of an aeroplane weighing approximately 53 tons and landing at speeds up-to 100 m.p.h. is reproduced.



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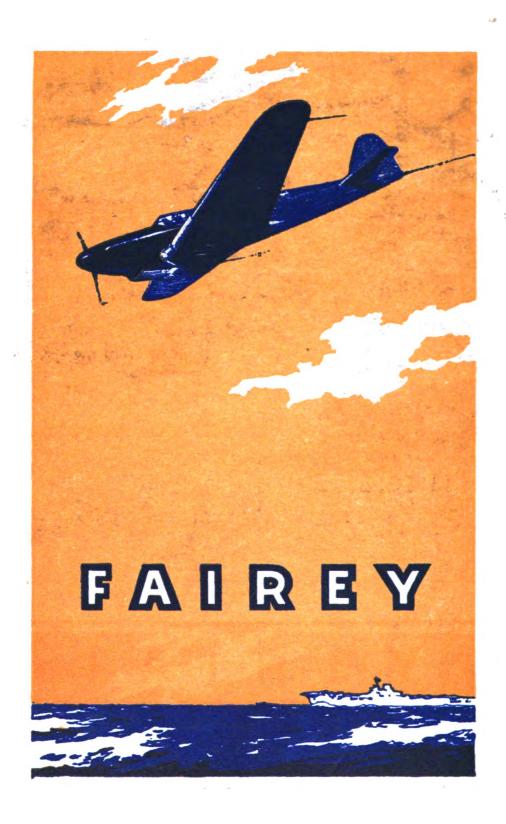
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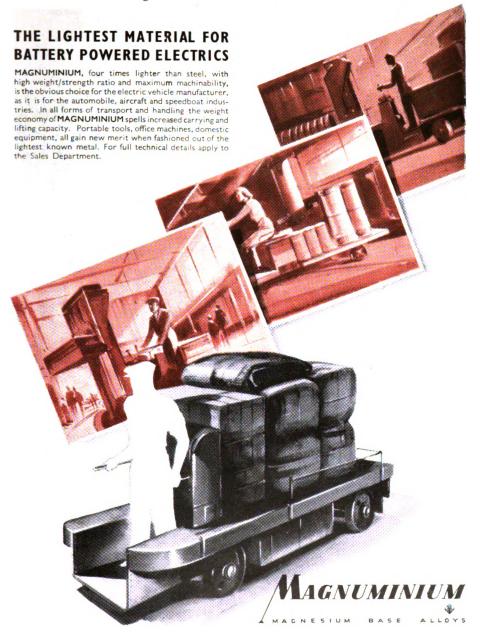
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EDITOR:

WING COMMANDER C. G. BURGE, O.B.E., q.s., R.A.F. (Retd.)

Assisted by an Advisory Committee of Members of the R.A.F. and Air Forces of the Dominions

VOLUME XVI

MARCH, 1945

NUMBER 2

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Full details of this Competition will be announced in the JUNE Number.

ROYAL AIR FORCE BENEVOLENT FUND

The amount donated to this Fund for the quarter ended 1st March, 1945, is given below:

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From D. R. P	2	2	0			
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March, 1945, Quarter	21	5	0			
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EDITORIAL

Service and Ex-Service Welfare Organizations

The time has come to take stock of the numerous organizations concerned with the welfare of Service and ex-Service men and women, and Service families. A question in the House of Commons drew from Mr. Morrison a list of the benevolent organizations, excluding Regimental and town funds, formed to assist serving or ex-serving members of the Forces and their families.

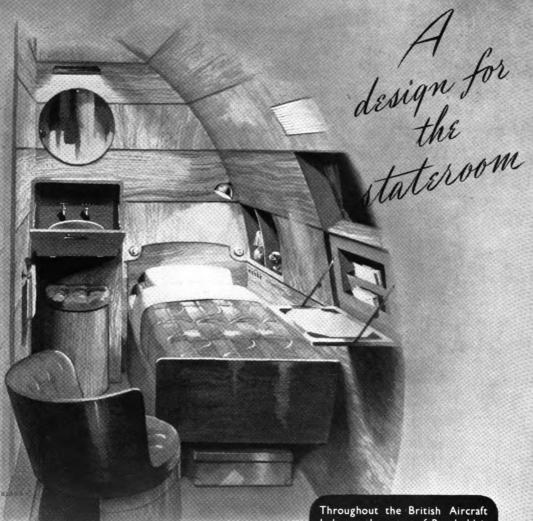
In order better to appreciate the position, the list as given in Hansard has been divided into specific categories to accord with the main scope and functions of these organizations:

- (A) TRAINING, SETTLEMENT AND CARE OF THE DISABLED.
- (i) Joint War Committee of the B.R.C.S. and Order of St. John of Jerusalem.
- (ii) St. Dunstan's.—Training, settlement and after-care of the blind.
- (iii) Towse Ex-Service Fund.—All blind ex-Service men, other than war-blinded, etc.
- (iv) Ex-Services Welfare Society.—Treat (and train where necessary) all ranks suffering from neurasthenia and mental breakdown. Recuperative homes, etc. Training, advice and after-care.
- (v) Royal Hospital, Chelsea.—Assistance and support to worn-out wounded, disabled and time-expired soldiers.
- (vi) Deafened Ex-Service Men's Fund of the National Benevolent Society for the Deaf.—Advise deafened men.

- (vii) Disabled Soldiers' Embroidery Industry (The Friends of the Poor Incorporated).—Teach embroidery to disabled ex-Service men who are too disabled to take up employment outside their own homes and to keep them supplied with work, etc.
- (viii) Queen Mary's (Roehampton) Hospital.
 —Treatment, artificial limbs, etc.
- (ix) St. Martin's Association.—Advise, assist limbless ex-Service men in matters concerning pensions, allowances, artificial limbs, housing problems, employment, etc.
- (x) The Village Centres for Curative Treatment and Training Council (Incorporated).—Treatment, training, etc.
- (xi) Incorporated Soldiers' and Sailors' Help Society and Lord Roberts Memorial Fund for Disabled Soldiers and Sailors.—Advice, etc., convalescent homes, etc., instruction.
- (xii) St. David's Home for Totally Disabled Sailors and Soldiers.—Reception and maintenance of totally disabled, incurable ex-Service men.
- (xiii) Star and Garter Home for Disabled Sailors and Soldiers.—Care and treatment.
- (B) Housing of Ex-Service Men and their Families.
- (i) Haig Homes.—Houses and flats for married ex-Service men, etc.
- (ii) Housing Association for Officers' Families.

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EDITORIAL

(iii) Crusaders of St. George.—Houses for totally disabled ex-Service officers and men who are in need of assistance, etc.

- (C) GENERAL WELFARE OF EX-SERVICE MEN AND WOMEN.
- (i) The Soldiers', Sailors' and Airmen's Families Association.—General welfare of the wives, widows, families and other dependants of members of H.M. Forces.
- (ii) United Services Fund.—Benefit of ex-Service men who served in the Army or R.A.F. and their dependants.
- (ii) (a) Earl Haig Appeal Fund, British Legion.—General welfare of men who have served in H.M. Forces and of their families.
- (ii) (b) The Officers' Association and Officers' Benevolent Department of the British Legion.—General welfare of officers, their wives, widows and dependants.
- (iii) Royal Air Forces Association.—General welfare of men and women who have served in the Royal Air Force, Auxiliary Air Forces, etc.
- (iv) Debt of Honour Fund.—Aid in re-settlement in civil life of ex-members of H.M. Forces.
- (D) EMPLOYMENT OF EX-SERVICE MEN.
- (i) National Association for the Employment of Regular Soldiers, Sailors and Airmen.—As title.
- (ii) King's Roll Clerks' Association Ltd.— Provide and obtain employment.
- (iii) Corps of Commissionaires. Employment.
- (iv) War Relief Toy Works.—Employment, etc.
 - N.B.—Those in Category (C) also concern themselves with this aspect.
- (E) Services' Benevolent Funds.
 - (i) Royal Naval Benevolent Trust.
 - (ii) Army Benevolent Fund.
 - (iii) R.A.F. Benevolent Fund.
- (F) Services Help-Yourself Associations. Hospitals, etc.

With these we are not concerned as they are supported wholly or mainly by annual subscriptions from those wishing, in case of need, to take advantage of the services so offered. The following are examples of such Institutions:—

King Edward VII Hospital for Officers.

Army, Navy, Marines and Air Force Provident Society.

The British Provident Association for Hospital and Additional Services.

Lady Grover's Hospital Fund for Officers' Families.

- (G) SCHOOLS FOR THE CHILDREN OF OFFICERS AND MEN OF THE SERVICES.
- (i) The Royal Victoria Patriotic School.—Administered by the Royal Patriotic Fund Corporation. For daughters of deceased sailors, soldiers, marines and airmen.
- (ii) Vanburgh Castle, Blackheath.—For sons of deceased airmen.
- (iii) Queen Victoria School, Dunblane.—For the sons of Scottish sailors, soldiers and airmen.

It is imperative that the work of all these organizations should be more closely co-ordinated. Co-operation is not enough, as this alone cannot cut out waste of effort through overlapping. There is quite obviously a case for amalgamation of many of these organizations. It is important that these and many other questions relating to the efficient and economic working of these organizations should be tackled immediately. Unless this is done there will be excuses, and maybe some justification, for other organizations to start up. In the interests of the Service and ex-Service men and women this must be prevented at all costs. But equally the interests of this body can be better served by an overhaul of existing organizations, amalgamations and more closely co-ordinated work-

The first requisite to bring this about would seem the formation of a Council composed of a body of men and women representative of the various interests but with allegiance to none. This Council should have the support and cooperation of all the Government departments concerned, e.g., Ministries of Health, Pensions, Labour. These Ministries should also be asked to nominate observers. Most of us in this war, certainly all those who have served their country in some capacity or other, will have acquired a bigger concept of comradeship and of community life; and all will have more fully recognized the need for the individual to pull his or her weight in the interest of the group.

A step in the right direction was taken recently by the British Legion. All benevolent work had been covered hitherto by British Legion and United Services Benevolent Committees. This work is now undertaken by Ser-

vice Committees also charged with the whole field of employment, training, pensions and all the needs of ex-Service men and women and their dependants. The National Executive Council has emphasized the desirability of the ex-Service community as a whole taking their share in discharging the duties of Service Committees whose members should be chosen from those who have served in all the Services, including the Women's Auxiliary Services and the Merchant Navy. "The principle of inviting other bodies and Societies administering funds which benefit ex-Service men and women to nominate representatives will apply as in the past. These include the Officers' Association; the British Legion Women's Section; Poppy Day workers; Emergency Help Committees of the Red Cross; Soldiers', Sailors' and Airmen's Help Society and Families Association; War Pensions Committees and social workers who assist now.

"By this means overlapping and duplication of effort will be reduced to a minimum.

"Properly worked, the new system should ensure what we all desire, a means of helping the smooth transition of serving men and women back to civil life.

"There is no reason why the Legion through its Service Committee should not be a centre in every town and village where everything affecting the ex-Service community can be swiftly and efficiently dealt with."

There is still much more that can be done, and the time has come for representatives of all the organizations named in the lists given above to get together with the object of voluntarily carrying out amalgamations and reorganization with the object of ensuring the most economic and efficient administration to the benefit of all those for whom the funds exist.

Of considerable interest and satisfaction also is the announcement made on 14th February in a letter to *The Times* by the newly formed British Council for Rehabilitation of the Disabled. Whether this Council is to embrace the organizations listed under (A) is not clear, but it may reasonably be assumed that this is the intention. The letter is reprinted in full on page xiv.

60 Years of Service Family Welfare

GROWTH OF THE WORK OF SSAFA

A welfare organization which has given help and advice to more than 2,000,000 Service families since the outbreak of war celebrated its sixtieth birthday recently.

It was on 14th February, 1885, that a letter from Colonel Sir James Gildea, of The Royal Warwickshire Regiment, appeared in *The Times*, drawing attention to the duty which "now devolves on the country in seeing that the wives and children of those ordered on active service are not altogether forgotten or that the cry of poverty and want be not added to that of suspense and anxiety," and appealing both for funds and voluntary workers to found an organization to look after serving men's families.

Within a month, as a result of that letter, Colonel Gildea was able to announce the foundation of the Soldiers', Sailors' and Airmen's Families Association, a voluntary organization which undertook from the beginning to do those personal things for the family of the fighting man which his service prevents him from doing himself. Since then the Association has continued, both in peace and war, until the present day, when it is charged with the great task of ensuring that the families of the men and women of all three Services " are not forgotten."

The work of SSAFA, as the Association is now colloquially known to the troops and their familes, falls into three main categories—to promote the well-being of the families, assisting them to solve their personal and domestic problems, to help them to apply for official allowances and grants, and to give immediate financial help in cases of hardship not covered by Government provision. In the United Kingdom, SSAFA now has 20,000 voluntary workers and 1,400 branches.

Because of the existence of its extensive home organization, SSAFA was asked by the War Office in 1941 to open an oversea service capable of supplying prompt answers to inquiries from men serving abroad about their families at home. That service, which has been used to date by 100,000 men, now covers the whole field of family welfare, and SSAFA offices and inquiry bureaux are open in the Middle East, Italy, North Africa, India, Malta, Paiforce and with the 21st Army Group in Europe, and another was opened within the past few weeks in Greece.

So great is the number of cases affecting the welfare of serving men and women's children that a separate children and homes department has been set up to deal with them. Permanent homes are found for children in cases where families have separated, the children's progress, education and welfare are watched over and

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reports sent regularly to the parent on whose behalf SSAFA is acting. Advice is available about special training for difficult children or those anxious to prepare for particular careers. Every year 6,000 children are taken care of in SSAFA's fourteen emergency homes for periods averaging a month, during times when, for some domestic reason, their mothers are unable to look after them.

The Disabled

REHABILITATION FOR CIVIL LIFE

A Newly Formed Council

(See Editorial, page ix.)

SIR.

The rehabilitation of the disabled is a subject which has come much to the fore in recent times and with a new significance. On the one hand, developments in the science of medicine and surgery have led to striking advances in the achievement of speedy and complete recovery. On the other, modern methods of training combined with these remedial measures have thrown a new light on the economic potentialities of the permanently disabled.

In dealing with this phase of rehabilitation the Government has given an inspiring lead by the recent addition to the Statute Book of the Disabled Persons (Employment) Act. This is a piece of legislation which opens up immense opportunities, alike for the worker and the employer, but to take full advantage of them the co-operation of many interests on a great scale will be necessary. And this is but one aspect of rehabilitation, which in the full meaning of the word extends from the moment when the disability is sustained to the point when the individual resumes a normal existence or the nearest possible approach to it. The process may involve questions not only of medicine, surgery, and the ancillary services, but many other problems psychological, sociological, and industrial. Moreover, the various categories of disablement have characteristics peculiar to themselves, which must be dealt with by the appropriate experts. To achieve the best results all these activities must be co-ordinated in a common effort and an ever-widening range of study and research is needed.

It is with such considerations in view that the British Council for Rehabilitation has recently come into existence. The primary aims of the Council are: To bring together workers in every field of rehabilitation so that all may learn from each and each from all and the many problems involved may be tackled along coordinated lines; to become a source of information and guidance on matters relating to the rehabilitation services; to organize short-term courses of study of the various aspects of rehabilitation, and to promote research into problems arising, more particularly those which concern the economic outlook of the permanently disabled. We wish to stress that in no sense is the council competitive with other existing bodies. Indeed, leading organizations representative of industry, medicine, and the social services are participating in addition to many individual members prominently associated with the various aspects of rehabilitation. The Council hopes to work in close co-operation with Government departments and welcomes the fact that the Ministries of Health, Supply, Labour, Pensions, and Fuel and Power have accepted invitations to nominate observers.

We are confident that the Council has a wide field of service before it, not merely as a forum for discussion but as an instrument for constructive and practical achievement. In the structure of social security which this country seeks to provide, a really comprehensive rehabilitation service is an indispensable element. The work to which the Council has set its hand is of value not only to the disabled themselves. large numbers of them injured in the country's service, but also the community and to industry To carry out the programme adeat large. quately must cost money, and we appeal now for contributions. We hope that a generous response will enable the Council to develop without delay the full scope of its activities. Donations should be addressed to the Honorary Treasurer, Mr. H. Vezey Strong, at the Council's office, 32, Shaftesbury Avenue, W.1.

Yours faithfully,

RUSHCLIFFE, Chairman of Council.

R. WATSON JONES, Chairman of Executive Committee.

H. VEZEY STRONG, *Honorary Trea*surer.

British Council for Rehabilitation, 32, Shaftesbury Avenue, W.1. 14th February, 1945.



Award of the Victoria Cross

The King has been graciously pleased to confer the Victoria Cross on the undermentioned airman in recognition of most conspicuous bravery:—

1370700 FLIGHT SERGEANT GEORGE THOMPSON, R.A.F.V.R., 9 Squadron, Bomber Command. (Deceased.)

This airman was the wireless operator in a Lancaster aircraft which attacked the Dortmund-Ems Canal in daylight on 1st January, 1945.

The bombs had just been released when a heavy shell hit the aircraft in front of the midupper turret. Fire broke out and dense smoke filled the fuselage. The nose of the aircraft was then hit and an inrush of air, clearing the smoke, revealed a scene of utter devastation. Most of the perspex screen of the nose compartment had been shot away, gaping holes had been torn in the canopy above the pilot's head, the inter-communication wiring was severed, and there was a large hole in the floor of the aircraft. Bedding and other equipment were badly damaged or alight; one engine was on fire.

Flight Sergeant Thompson saw that the gunner was unconscious in the blazing mid-upper turret. Without hesitation he went down the fuselage into the fire and the exploding ammunition. He pulled the gunner from his turret and, edging his way round the hole in the floor, carried him away from the flames. With his bare hands he extinguished the gunner's burning clothing. He himself sustained serious burns on his face, hands and legs.

Flight Sergeant Thompson then noticed that the rear gun turret was also on fire. Despite his own severe injuries he moved painfully to the rear of the fuselage, where he found the rear gunner with his clothing alight, overcome by flames and fumes. A second time Flight Sergeant Thompson braved the flames. With great difficulty he extricated the helpless gunner and carried him clear. Again, he used his bare hands, already burnt, to beat out flames on a comrade's clothing.

Flight Sergeant Thompson, by now almost exhausted, felt that his duty was yet not done. He must report the fate of the crew to the captain. He made the perilous journey back through the burning fuselage, clinging to the sides with his burnt hands to get across the hole in the floor. The flow of cold air caused

him intense pain and frost-bite developed. So pitiful was his condition that his captain failed to recognize him. Still, his only concern was for the two gunners he had left in the rear of the aircraft. He was given such attention as was possible until a crash-landing was made some forty minutes later.

When the aircraft was hit, Flight Sergeant Thompson might have devoted his efforts to quelling the fire, and so have contributed to his own safety. He preferred to go through the fire to succour his comrades. He knew that he would then be in no position to hear or heed any order which might be given to abandon aircraft. He hazarded his own life in order to save the lives of others. Young in years and experience, his actions were those of a veteran.

Three weeks later Flight Sergeant Thompson died of his injuries. One of the gunners unfortunately also died, but the other owes his life to the superb gallantry of Flight Sergeant Thompson, whose signal courage and self-sacrifice will ever be an inspiration to the Service.

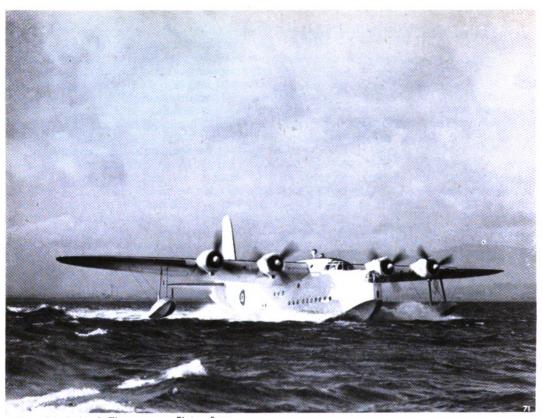
Plastic Airman

His face is smooth as sculptured faces are, His features fair enough to draw a girl's Arch backward glance, his disciplined blond curls

Swept from a grafted brow without a scar.

But this young mottled face does not betray, As other faces do, the moods behind—
If he has secrets, they are locked away:
He looks out at the world from a drawn blind Screening the man he was. And who was he?
Only the grave eyes know, and do not tell . . .
Be gentle with him, World, who has foregone His unique pattern, his identity:
Be tender, lest the frozen mask should melt Abruptly, and surprise us with its scorn.

M. W. J.

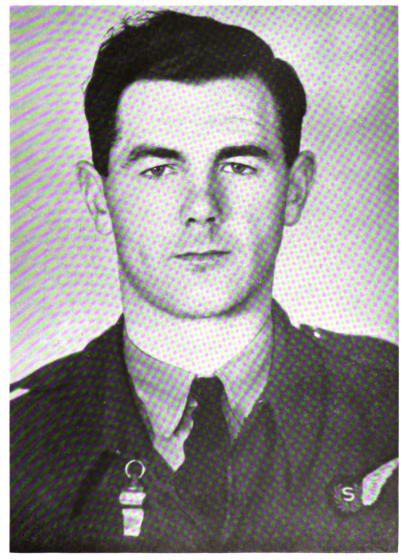


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xvi



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THE LATE FLIGHT SERGEANT G. THOMPSON, V.C. (The citation of the posthumous award of the V.C. to this airman is given on page xv)



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THE LATE AIR CHIEF MARSHAL SIR TRAFFORD LEIGH-MALLORY, K.C.B., D.S.O.

Commanded a Fighter Group in the Battle of Britain and became Commander-in-Chief Fighter Command. Became the Air Commander-in-Chief of the Allied Expeditionary Air Forces for the liberation of Western Europe. Was finally appointed the Air Commander-in-Chief South-East Asia Command, now presumed killed on his way by air to take up the latter command

The Case for an Independent Air Corps

By LIEUTENANT N. R. RENNIE AND CAPTAIN PAUL JEFFERIES.

THE higher commander possesses a weapon in the Division of the Air Corps capable of exploiting the range and speed of air power to provide ground fighting power. Airborne operations in this war have revealed some of the battle uses of airborne troops but, with the exception of some isolated cases, they can all be considered prepared operations.

They have been used as Advanced Guards (e.g., Sicily and Algeria), island seizure task forces (e.g., Crete) and as saboteur raiders. All these operations were carefully prepared phases of offensives. Other suitable operations of this type can be visualized such as "the envelop-

ment of an enemy force."

The stress of war has welded service co-operation to such a degree that the present organization of airborne troops is equal to any demands of a higher commander as long as time for detailed preparations is allowed. This cohesion of the Services would slacken with the years of peace and there would be no concentration or continuity of development in the air.

If this were the whole case, the formation of the Air Corps should be delayed until the end of the war to avoid the administrative difficul-

ties of a change-over.

The trend of the war towards stabilization and equality of strength throws "opportunity" high up amongst the factors for Services. The airborne arm as it is organized at the moment can give the high commander only a limited

assistance in this sphere.

An Air Corps organized on the lines suggested hereafter, on the other hand, gives him a force ideally organized as a weapon of opportunity. Just as the higher commander can call for close air support to meet a sudden situation so could he call upon the Air Corps to exploit a success or block enemy penetrations. The main limiting factor of an Air Corps operation is its inequality of weapons in the development of the ground fight. Enemy reserves must, therefore, be pinned or the Air Corps reinforced with ground troops.

If the 8th Army had possessed a Division of the Air Corps at the time of El Alamein the complete destruction of the Afrika Corps might

very well have been achieved.

The question of ground troop reinforcement raises the possibility of the co-operation of cruiser tanks and airborne forces.

An immediate re-organization of the airborne

forces need only involve the creation of the staff machine. The remainder of the organization can remain an Army and R.A.F. sphere except for the field units that would be grouped under the staffs. With the return of peace the Air Corps must be centralized to retain continuity of development.

We are of the opinion that the need exists for forming an independent force of airborne troops who would bear the same relationship to the Royal Air Force as the Marines do to

the Admiralty.

If it is accepted that weapons are the dictators of battle tactics, the reason for the success of the R.A.F. in 1940 can easily be found. The aeroplane was a new weapon of World War I. It was appreciated that the battle tactics demanded by this new weapon would best flourish within an independent organization and that, if air power remained the adjunct of land and sea forces, it would be developed and organized to support these forces, not to defend When the well-trained and conquer the air. close-support air force of the Luftwaffe, fresh from its 1940 triumphs, wrestled with the numerically inferior R.A.F. Fighter Command, it was defeated because this R.A.F. Fighter Command had thought of and trained for the battle of the air in the years of peace. The creation of our Middle East Tactical Air Force, far from emphasizing that the aeroplane should be considered and developed as an Army weapon, has proved by its success that the Air Force designed primarily to attain air superiority will knock out the opposing support air force and will then be in a position to provide the Army with support. In fact, it can now be said that close ground support is an adjunct of air power deserving specialized consideration.

Another adjunct of air power is the airborne soldier, one of the new weapons of World War II. If, by analysis, it is possible to visualize the weapon in and beyond its infancy and determine at an early stage the organization best suited to its battle tactics, then the United Kingdom will once again lead the world in

providing for any future conflict.

61

Our analysis is based on the supposition that the constants of the battle are Information, Hitting Power, Mobility, Protection and Morale and that man's application of these constants by weapons dictates battle tactics, and finally that organization derives from battle tactics. The analysis builds up the outline of a hypothetical independent force of airborne troops which for simplicity sake is referred to as the "Air Corps."

THE WEAPON

The characteristics of the airborne soldier are that he operates from an aerodrome, is transported in aircraft, lands in hostile territory without his own ground troops directly supporting him, and then fights on the ground. Firstly, he can be considered an airman, in that he sets out from an R.A.F. aerodrome and is dependent upon all the factors affecting a flier until he is actually on the ground. Secondly, he can be considered a soldier as he has to do his actual fighting on the ground. The prime individuality of the airborne soldier lies in reconciling the airman and the soldier.

The airborne operation can be considered in three phases—the air move, the air bridgehead and the ground fight. The first phase makes the airborne operation an adjunct of air power. The Air Corps, the Marines of the R.A.F., would operate from within the R.A.F. and from the air bridgehead and, if necessary, carry out limited tasks as ground troops. When air transport has been developed, the air bridgehead could receive normal ground troops transported by air for large-scale operations.

The primary object, then, of the Air Corps is to land in hostile territory from the air and to provide a ground task force or protect the landing of an air transported army formation. The weapons that are publicly known to be available and have been considered are shown in Appendix I. Ignorance of the latest allied transport aircraft and their performance have forced us (the authors) to use the Junkers 90 as the basic aircraft unit, but it is important to remember that technical development in this direction will result in tactical and organizational changes.

BATTLE TACTICS AND ORGANIZATION

The key factor in deciding the Air Corps' tactics is the necessity for forming air bridge-heads. The size and nature of the air bridge-heads will naturally vary with the task allotted, but the organization will have to be centralized and flexible. The largest unit of the Air Corps at present envisaged is a division of 10,000 men equipped with guns and tanks and capable of landing under ideal conditions in less than an hour. One of these divisions could be carried within the Air Force of a theatre of war such as the Middle East, 1940-42. Much smaller

units could be organized which would still retain the same balance of arms and tactical principles, on a small scale, as the division.

The object of forming the bridgehead is to secure and protect the landing of the task force. This will be achieved by landing shock units to seize surrounding tactical features. Air bridgehead seizure can be considered under three headings (cf. Appendix II). First, the selection by the staff of main and protective landinggrounds; secondly, the simultaneous landing of light companies on the protective landinggrounds; thirdly, the consolidation of the bridgehead. It is essential that the light companies be ready for action in a minimum of time. therefore the tactical unit must be the aircraft load, and weapons must be landed with the man. This will give an almost immediate potential of short-range, light automatic fire, whilst fire and range will be given reinforcement by the L.M.Gs. and support weapons, of the third sections, which will be dropped in containers. The delay in moving these third sections into action would be covered by the light sections. Each platoon on landing will cover the landing of the following platoon and work forward to its tactical objectives. This phase will have all the advantages of surprise and, providing their localities have been well selected, the light companies should always succeed until the counterattack in strength develops. If these are the task force themselves with a specialized saboteur mission, they will rely on infiltration in small groups to achieve their objective, but if their duty is to protect the further landing of a specialized force, then they must be co-ordinated and reinforced with suitable weapons of consolidation. In this third phase, co-ordination will be directed by Headquarters, dealt with under "Staff" in greater detail, and reinforcements will be made by the landing of heavy companies. The armament of the heavy companies has been designed to cope with the counter-attack.

To engage the Air Corps force whilst it is still landing its elements, the enemy will be forced to use his mobile troops. His formations in order of mobility as far as the rest of Europe is concerned are aerial, motor divisions, armoured divisions, and infantry divisions. To deal with the motor divisions the fire power must be built up, whilst A./T. guns must be included to deal with tanks. It is probable that the use of airborne troops will force the defence to build up light formations of motor infantry, armoured cars and light tanks so that light A./T. weapons for the heavy companies deserve considerable technical attention. The R.A.F.

must provide the chief protection against aerial counter-attack and it might be found practicable to use heavy, long-range bombers of the Fortress type adapted to provide maximum fire-power.

The main object of the light and heavy companies in this phase is to build up an all-round defence for the main landing-ground selected for the task force. A suggested organization for this bridgehead seizure force is detailed in

Appendix III.

The object of the task force is to utilize the air bridgehead to land a force equipped with adapted army weapons to achieve an objective by ground fighting. Although it is visualized that army troops will be able to exploit these air bridgeheads the Air Corps itself must possess elements equipped with all the land weapons that can be transported by air, otherwise it will lose one of its main values to the higher commander. He would be able to fling out of air power a force capable of achieving considerable objectives by land fighting in a minimum of time.

The operations required of this task force will be either offensive or defensive. The 5th Regiment of the division has been formed to undertake the study and use of offensive weapons whilst the gun platform of the divisional artillery will provide the basis of the defensive battle. Consequently, the Fifth Regiment has been built round a tank capable of being air-lifted and the Divisional Artillery Round A./T., A./A. and field guns also capable of being air lifted (cf. Appendix IV).

The organization of the 5th Regiment involves difficulties that do not affect armoured troops of the land force. First, the air lift makes the basis of fire power the tank and not the troop. Secondly, the period during which the regiment is moving through the air is particularly vulnerable to air attack as the objective of the mission has been disclosed by the bridgehead shock troops. Therefore the tactical unit will have to be large enough to withstand casualties in the air and still be effective on the ground. Thirdly, its organization must be sufficiently fluid to provide for varying efforts without radical changes. The task force must also be capable of making support troops mobile to achieve maximum assault power.

The offensive task force therefore has two main echelons: (a) The Armoured 5th Regiment with a total of fifty tanks, organized into six tactical units called squadrons with an R.H.Q., and (b) the support echelon of light transport capable of mounting one heavy battalion of the 4th Shock Regiment to which

it is attached, or of towing guns. The maintenance of the 5th Regiment requires special attention. Owing to the fact that the Air Corps exists normally within the R.A.F. it is possible to arrange extensive rear area maintenance, but on the other hand, once the regiment has joined battle on the ground, a recovery system is impracticable. Therefore fitter teams equipped to cannibalize, unditch and replace parts are attached to the squadrons and to R.H.Q.

At present transport aircraft do not make it possible to have a specialized Reconnaissance Group in the 5th Regiment, but this should be developed as soon as it is technically possible. As a temporary substitute a number of motor-cycles can be included in the Ground Transport Wing of the 4th Regiment, which could provide a Motor Cycle Light Reconnais-

sance Company.

Owing to the immediate requirement of A./T. weapons in the third phase of the bridge-head battle, these weapons are decentralized to regiments. When a co-ordinating control has been established, some or all of these weapons can be concentrated within the Divisional C.R.A.'s Command. This Command will consist of a battery of sixteen Oerlikon A./A. guns and a battery of eight 105 mm. field guns. The Divisional Artillery is designed to form the nucleus of ground-fire support and is potentially suitable for considerable technical development.

The method of bridgehead seizure dictates the sequence of the air move. The air move can be considered from three perspectives: (i) the aircraft, (ii) the aerodrome, (iii) the landing ground.

The aircraft is the basis of the force. Its technical development is an aviation problem, but its specialized requirement as a transport aircraft for the Air Corps demands the training of specialists conversant with the whole problem. Whilst this group is not included in the organization of our hypothetical force, they would form a normal section of the Air Ministry's technical planning staffs. The direct influence of the aircraft itself upon tactics and organization has already been considered except for one important characteristic—the aircraft or glider must operate from an aerodrome under the same air technical limitations as any other arm of the R.A.F. and it must land. This confines the start of the air move to an R.A.F.

The third perspective reveals a new difficulty. To land in hostile territory on unprepared landing grounds demands firstly a staff to consider geographical influences, and secondly a staff to operate the landing ground. Therefore,

the Air Corps must include organizations to provide for the take-off and the landing; owing to its inter-relation with the R.A.F. its airfield existence dovetails with the R.A.F.'s. The Provost Wing of the Air Corps will deal with the problem of operating the landing-ground itself whilst the Intelligence Wing will include specialists in terrain, etc.

THE WINGS

The term "Wing" has been used in naming the auxiliary services of Provost and Intelligence. Whilst these specialized groups are necessary together with the various arms that build up the ground fighting power, they must be organized so that they are corporate with any other arm of the Air Corps. In other words, they must bear the same relationship to each other as the driver mechanic and driver operator in an Armoured Regiment—not the relationship between a regimental signaller and a signaller in the Royal Corps of Signals. The reason for this emphasis lies in the nature of the Air It will not be the neat and Corps' battle. ordered battle of the field armies but one of accentuated disorder and confusion, where every soldier of the Air Corps must be prepared to do any job. The morale of the Corps must be based on the Corps, not an individual trade.

The specialized geographical data required for the selection of landing-grounds is a minor responsibility of the Intelligence Wing. It will briefly have to operate a system whereby sections allotted down to companies and landing in the first echelons will collect, interpret and pass back information along an independent channel to rear headquarters. Here, further sections will be collating this information, interpreting air reconnaissance and generally performing headquarter intelligence duties. The importance of this intelligence link cannot be over-estimated.

The Provost Wing will be responsible for discipline and operating the landing-grounds. The latter involves attaching sections down to companies that are included in the order of battle of a landing formation. Each landing area will have a small staff controlling its provost-wing activities, which will involve such duties as removing gliders, parachutes, obstacles, etc., and combating fires. The speed of the force landing will largely depend upon the efficiency and adaptability of this wing.

The Supply Wing will be responsible for bringing all stores forward of rail head or R.A.S.C., R.A.O.C. and R.E.M.E. rendezvous. They can be considered specialists in accumulating, loading and delivering stores from air-

field to bridgehead. An M.T. section and stores sections will operate from the rendezvous to airfield. The normal procedure for a formation wanting stores whilst actually operating in air bridgeheads will be for unit quartermasters to pass back requirements to the staff captain or quartermaster's representative according to the size of the formation involved. The staff captain or substitute will then radio back to the D.A.Q.M.G. (Rear Divisional H.Q.) requirements and rendezvous. The D.A.Q.M.G. will in turn pass this information back to the Air Corps supply wing, who will be responsible for getting the stores forward. This procedure, although the ideal to be arrived at, will be far too slow for the bulk of Air Corps operations. It would only come into operation once the air bridgehead had been made thoroughly secure by ground-force exploitation. The supply problem during bridgehead formation and the initial exploitation would have to be answered by a pre-arranged plan of delivery coming into action. Air deliveries of ammunition and of other immediate battle stores in quantities previously arranged would be dropped at predetermined points. An issuing staff of the Maintenance Wing will see that the stores are moved forward to battalion headquarters in the initial phases and then to headquarters of regiments. Forward of these points, movement of stores is a unit responsibility.

The Maintenance Wing has already been mentioned in connection with the organization of the 5th Regiment. It will be organized to give maximum vehicle, plane and weapon maintenance at and rear of airfields as far as, but not including, base workshops. Forward of airfield, sections will be attached to units according to requirements. They will be equipped to recover, cannabalize and replace.

The Air Transport Wing includes all personnel operating and maintaining the transport aircraft and gliders of the Air Corps, except for the fitter and workshop staffs, who will be provided by the Maintenance Wing. The Transport Wing must be organized to lift the whole division in one operation, but, at the same time, retain flexibility for varying efforts. It will be controlled by its own Divisional Headquarters, who will organize the entire take-off from airfields, after it has received the order of battle. The aircraft will be organized into regimental and company groups according to the units they are going to lift. Thus the 1st Air Transport Regiment will lift the 1st Regiment, or the 2nd, 3rd or 4th, whilst the 5th Air Regiment will lift the 5th Regiment. A regimental headquarters is, of course, capable of controlling an improvized regiment to lift a specialized "task force."

The Engineer Wing will be responsible for normal engineer duties, with particular emphasis on mine-laying and landing-ground development. Their organization will be fluid in order to provide for the maximum required effort for the individual operation. Normally they will be attached to Force Headquarters with sections attached down to companies.

The Signal Wing will be responsible for the maintenance of Signal equipment and the operation of the nerves of control. It will be dealt with more fully under the heading "Staff and

Control."

A Medical Wing and Pay Wing complete the divisions of the Air Corps.

STAFF CONTROL

The control system must aim at achieving the maximum freedom for the field units.

The Corps Headquarters will be responsible for training, tactical and technical development and the general administration of the Force.

The largest field unit envisaged at the moment is the Division. This would form a component of the Tactical Air Force in a theatre of war. If the theatre does not warrant a full division, brigades, fluidly organized, can be allotted.

The organization of brigade headquarters will be along the same lines as a divisional headquarters. The special factor that the headquarter's organization must overcome is the change-over of control from the airfield and air move to the ground fight. First, the headquarters must interpret the higher commander's orders and set it against a highly up-to-date intelligence picture. Secondly, it must issue the divisional commander's order of battle to the officer commanding the air move and to the commanders of all units involved, including administrative. Thirdly, it must co-ordinate R.A.F. support.

These activities can be considered the sphere of Rear Divisional Headquarters. It will initially be commanded by the divisional commander but, at a stage in the battle's development, he will go forward, and control will be assumed by his G.1 until Advanced Divisional Headquarters is set up by the divisional com-

mander,

In order that Rear Divisional Headquarters might operate with the maximum speed and efficiency, its activities will be split up as follows:—

(i) The Headquarter staff under G.1 will be responsible for Intelligence and the issuing of

the Divisional Command's order of battle and R.A.F. co-ordination.

(ii) An administrative staff under the D.Q.M.G. will be responsible for preparing the administrative plan to put the order of battle into action and maintaining it in action.

(iii) The H.Q. Air Transport Wing will be responsible for interpreting the order of battle and commanding the actual move. All unit 21/cs will attend the A./T./W. Commandos Orders to facilitate rapid concentration and

employing of units.

Control is comparatively easy as far as this stage in the operation. The divisional commander has started his runners and has now got to catch them up and regain control. The moment at which he leaves Rear Divisional Headquarters and goes forward must be left to his own decision. The initial phases of the air bridgehead operation will be a series of individual unit actions which the officer i/c bridgehead will attempt to co-ordinate as quickly as possible. This officer, with his personal staff, will be landed with the initial echelons. The goal of the divisional commander will be to land with the advanced formations of the ground striking force and personally direct its effort. As soon as the divisional commander feels that his Advanced Headquarters is in a position to control the battle, Rear Headquarters will relinquish its direction, but will continue to operate the administrative plan and collect information.

This system of controlling the Air Corps has been made possible by the recent development of R./T.; in fact, it might be claimed that the possibilities of an Air Corps lies equally between this development and advances in aerial design. Broadly speaking, the signal system can be divided into horizontal and vertical con-

trols.

1. Horizontal. — The first four regiments operate wireless sets (large approximately fifteen miles) on a regimental frequency. Alternatively battalion frequencies can be quickly substituted before the "air" becomes crowded, but this should not be necessary as there is no continuous fire control in these regiments. The Regimental Artillery will have a separate frequency allotted for O.P. work in order to allow the guns freedom of control. The O.P. will have two sets—one on the O.P. frequency and the other on the regimental frequency.

In the case of the 5th Regiment, continuous fire control does take place, at least as far as the tank echelon is concerned, and will, therefore, operate with squadron frequencies with

an alternative regimental frequency.

The Divisional Artillery will have a unit frequency with separate frequencies allotted for O.P. work.

2. The Vertical Control involves more complications and from Rear Divisional Headquarters a number of channels are maintained to each Regimental Headquarters and the Headquarter Air Bridgehead. These channels are maintained throughout the action. Another channel passes through Air Transport Divisional Headquarters to transport regiments and thence to aircraft with frequency charges at each stage.

When Advanced Divisional Headquarters takes control a channel is set up with Rear Headquarters and another is sent forward to the air bridgehead officer and regiments.

Three more independent frequencies are allotted. First, on information carried on one frequency linking battalions, regiments, Air Bridgehead Headquarters, Advanced Headquarters and Rear Headquarters. Secondly, an administrative frequency operating between regiments. Air Bridgehead Headquarters, Advanced Headquarters and Rear Headquarters. Lastly, a medical frequency passing back along similar lines.

The operation of this nerve system will be the responsibility of the Signal Wing.

APPENDIX I

THE INSTRUMENTS AVAILABLE AND CONSIDERED IN EVOLVING THE BATTLE TACTICS OF THE AIR CORPS

These are classified and considered as nearly as possible according to the particular fundamental of battle which they apply.

A. The Map.

The Reconnaissance Aircraft.

The Camera.

Meteorological Instruments.

General Intelligence System.

Wireless.

Telephone.

B. Pistol, Machine-Carbine, Rifle, Light Machine Gun, Bayonet, Grenade.

Mortar, Medium Machine Gun, Heavy Machine Gun, Anti-Tank Rifle.

Heavy Mortar, Howitzer, Gun/Howitzer, Field Gun, Anti-Tank Gun, Anti-Aircraft Gun.

Flame-Thrower, Explosives, Chemical Warfare.

- C. The Transport Plane, Glider, Parachute. Tank, Armoured Car, Truck, Motor Cycle, Bicycle.
- D. Anti-Tank Mine, Demolitions, Smoke, Wire.

APPENDIX II

THE SEIZURE OF AN AIR BRIDGEHEAD

PHASE 1

A landing-ground for the task force and tactical localities which must be held to protect it are decided. Landing-grounds are found for the units which are to capture these localities. Landing-grounds and tasks

are allotted to units.

The main "task" force landing-ground surrounded by others on which units are to be landed to protect it and the ground around these, in so far as it is controlled by the airborne troops, constitutes the air bridgehead. Diagram 1 shows a divisional bridgehead without reference to ground features.

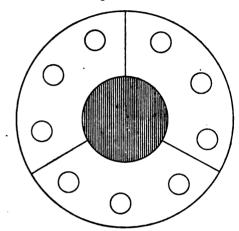


DIAGRAM 1.—THE DIVISIONAL AIR BRIDGEHEAD Key to Diagram 1

Scale: 1 in. to 1 mile.

Central shaded circle represents the area containing the landing-ground or grounds selected for the task force.

Each sector of the large outer circle is a regimental locality.

Each small circle within these sectors is a battalion landing area. This air bridgehead represents the maximum effort

of the division.

From this diagram of an air bridgehead, definitions of the terms to be used hereafter can be given.

An Air Bridgehead.

A bridgehead for the landing of an airborne task force, consisting of a landing-ground for this force protected by set localities.

A Regiment Locality.

A defence zone sited to protect the principal landing-ground of an air bridgehead, consisting of a number of sub-unit landing areas.

A Landing Area.

A defence zone consisting of a battalion landingground protected by an all-round defensive zone on depth manned by the battalion.

A Landing-ground.

Any area on which troops or their equipment are air-landed.

PHASE 2

Landing areas are captured by light companies. Capture completed in five stages.

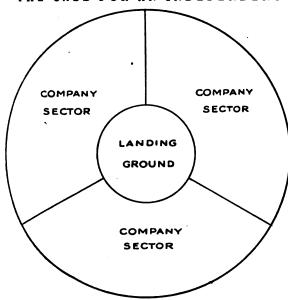


DIAGRAM 2.—THE LANDING AREA Scale: approximately \(\frac{1}{2}\) in, to 100 yds.

Each light company is made responsible for one sector of the protective defensive zone around the landing-ground.

Stage A. (Time: Zero.)

1st Platoon of each company makes landfall.

Light sections move off instantly into respective company sectors.

Heavy sections assemble and gather weapons and ammunition from containers.

Stage B. (Time: Zero plus 3 in.)
2nd Platoon of each company makes landfall. Light Sections move off instantly into respective company sections.

Heavy sections assemble and gather weapons and

ammunition from containers.

Light and Heavy Sections of 1st Platoons continue as in Stage A

Company Headquarters make landfall.

Stage C. (Time: Zero plus 6 in.)
3rd Platoon of each company makes landfall. Light Sections move off instantly in respective

Company Sectors.

Heavy Sections assemble and gather weapons and ammunition from containers.

Light and Heavy Sections of 2nd Platoons continue as in Stage B.

Heavy Sections join 1st Platoons which assist 2nd Platoons by fire and movement as necessary.

Company Headquarters are established. Wireless

Company Headquarters are established. contact with 1st Platoons made.

Stage D. (Time: Zero plus 9 in.)

3rd Platoons continue as in Stage C.

Heavy Sections join 2nd Platoons which assist 3rd Platoons by fire and movement as necessary.

1st Platoons consolidate.

Company Headquarters make wireless contact with 2nd Platoons.

Stage E. (Time: Zero plus 12 in.)
Heavy sections join 3rd Platoons which move to final positions and consolidate.

2nd and 1st Platoons consolidate,

Company Headquarters make wireless contact with 3rd Platoons.

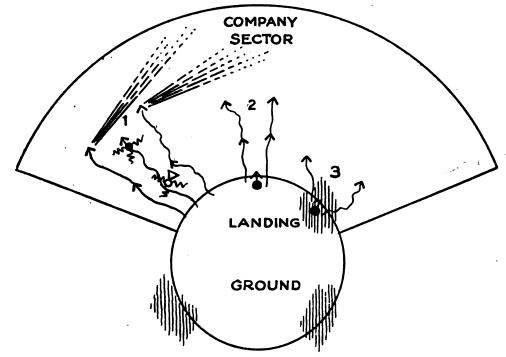
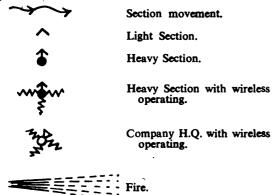


DIAGRAM 3.—COMPANY SECTOR AND LANDING-GROUND DURING CAPTURE OF LANDING AREA. STAGE C.

Key.—Shaded areas, points at which Light Company platoons are making landfall. Numbers refer to platoons.



During Phase 2, each of the stages A to E takes place in all three company sectors simultaneously.

PHASE 3

Landing area is consolidated by Heavy Company. This consolidation begins during Stage D of the capture of the landing area by the Light Companies, and is completed in eight stages.

Stage D. (Time: Zero plus 9 in.)

Light Companies as Phase 2.

1, 2 and 3 Platoons of Heavy Company land. Assemble weapons.

Company Headquarters land.

Stage E. (Time: Zero plus 12 in.)

Light Companies as Phase 2.

Battalion H.Q. glider lands. Battalion commander takes control. If resistance heavy, stiffens company sectors with 1, 2 and 3 Platoons of Heavy Company. If resistance not immediately heavy, forms opera-tional reserve from 1, 2 and 3 Platoons of Heavy Company.

Stage. F. (Time: Zero plus 12 in.)

1st Attached troops' glider lands (Platoon Air Corps Provost Wing, Platoon Air Corps Medical Wing).

Provost Wing erect weather bureau, remove minor obstacles, mark the landing-ground, remove gliders and parachutes.

Medical Wing establish dressing station.

Battalion H.Q. glider is moved to suitable position to form Battalion H.Q. and wireless station.

Platoons of Heavy Company continue as Stage E.

Stage G. (Time: Zero plus 14 in.)

2nd Attached troops' glider lands (Platoon Air Corps Intelligence Wing).

Engineer Platoon and Intelligence Section report to Battalion H.Q. for orders.

Provost Wing prepares to receive Heavy Weapons

Platoon gliders.

Stage H. (Time: Zero plus 15 in.)

Mortar glider of Heavy Weapons Platoon lands. Provost Wing assist in unloading. Section leaders to Battalion H.Q.

Stage J. (Time: Zero plus 16 in.)

1st A./T. glider of Heavy Weapons Platoon lands. Provost Wing assist unloading Platoon Commander to Battalion H.Q.

(Time: Zero plus 17 in.)

2nd A./T. glider of Heavy Weapons Platoon lands.

Stage L. (Time: Zero plus 25 in.)

Light Companies in action.

Heavy Company, 1st, 2nd and 3rd Platoons in reserve.

Heavy Weapons Platoon taking up final positions. Battalion H.Q. in wireless touch with Regimental Commander. Asks for any assistance required from Heavy Battalion.

Provost Wing platoon completing clearing of landing-ground and other tasks as in Stage F.

Medical Wing platoon operating dressing station and assisting to bring in wounded. W.W.C.P. estab-

lished. Engineer Wing platoon carrying out defensive demolitions, laying mines and improving landing-

ground, if necessary.

Intelligence Wing section supplying continuous picture of battle to Battalion Commander and also passing this direct to Regiment on own information wireless circuit.

The Regimental Commander has available at this stage as reserves in the air the Heavy Battalion and the Regimental Artillery. He will direct these to battalion landing areas as the situation demands. Where infantry reinforcements are required, a Heavy Company plus proportion of Support Company will normally be sent. Where anti-tank assistance is required this will come from Regimental Artillery.

APPENDIX III

THE ORGANIZATION OF THE BRIDGE-**HEAD SEIZURE FORCE**

1.—THE LIGHT SECTION

Section Leader (N.C.O.). Second-in-Command (N.C.O.).

8 Men.

Armament—

- 10 Machine Carbines.
- 10 Bayonets.
- 20 Grenades (No. 69).

Manpower: 10.

2.—THE HEAVY SECTION

Section Leader (N.C.O.). Second-in-Command (N.C.O.).

7 Men.

Armament—

- 3 Bren Light Machine Guns. .
- 1 2-in Mortar.
- 1 A./T. Rifle.
- 9 Pistols.

Manpower: 9.

3.—THE LIGHT PLATOON

Platoon Commander (Officer). Platoon Sergeant (N.C.O.). Platoon Corporal (N.C.O.). Platoon Runner.

2 Light Sections. 1 Heavy Section. Armament— Armament— 21 Machine Carbines. 1 2-in. Mortar. 1 A./T. Rifle. 20 Bayonets.

40 Grenades. 12 Pistols. 1 Wireless Set (Platoon 3 Bren Guns. Corporal).

Manpower: 33.

4.—LIGHT COMPANY

Company Commander. Company Second-in-Command. Company Sergeant-Major. 2 Signallers.

1 Orderly (Cyclist).

Armament-

3 A./T. Rifles. 40 Pistols. 65 Machine Carbines. 60 Bayonets. 120 Grenades. 4 Wireless Sets. 9 Bren Guns. 1 Bicycle.

3 2-in. Mortars.

Manpower: 105.

5.—THE PLATOON

Platoon Commander. Platoon Sergeant. Platoon Corporal. Platoon Runner (Cyclist). 2 Mortar Men. Orderly/Runner.

3 Sections. (N.C.O. and 7 men.)

Armament-18 Rifles.

1 A./T. Rifle. 4 Machine Carbines. 9 Pistols. 18 Bayonets. 3 Bren Guns.

1 Wireless Set. 1 Bicvcle.

1 2-in Mortar.

Manpower: 31.

6.—THE HEAVY WEAPONS PLATOON

Platoon Commander. Platoon Sergeant. Platoon Corporal. Platoon Runner.

Anti-Tank Section of two 2-pdrs. (10 men). 2 Mortar Sections, each of two 3-in. Mortars (8 men).

Armament—

17 Pistols.

6 Rifles. 7 Machine Carbines. 2 2-pdr. A./T. Guns.4 3-in. Mortars. Wireless Set.

Manpower: 30.

7.—THE HEAVY COMPANY

Company Commander. Company Second-in-Command. Company Sergeant-Major.

2 Signallers.
1 Orderly (Cyclist).
3 Platoons. 1 Heavy Weapons Platoon. Armament-60 Rifles. 54 Bayonets. Armament-48 Pistols. 21 Machine Carbines. 2 2-pdr. A./T. Guns.4 3-in. Mortars. Bren Guns. 3 2-in. Mortars. Wireless Sets. 3 A./T. Rifles. 4 Bicycles.

Manpower: 129.

8.—THE LIGHT BATTALION

Battalion Headquarters (12). 1 Heavy Company. 3 Light Companies. Armament-Armament-

60 Rifles. 168 Pistols. 216 Machine Carbines.

2 2-pdr. A./T. Guns. 4 3-in. Mortars. 19 Wireless Sets. 234 Bayonets. 36 Bren Guns. 12 2-in. Mortars. 8 Bicycles.

12 A./T. Rifles.

Manpower: 456.

9.—THE SUPPORT COMPANY

Company Headquarters (6). 1 Besa Platoon of two sections, each two Besa

Machine Guns (15 men).

2 Artillery Platoons of three sections, each one 6-pdr. A./T. guns (22 men per platoon). Armament-

4 Besa Machine Guns. 8 Rifles. 31 Machine Carbines. 6 6-pdr. A./T. Guns.

4 Wireless Sets. 26 Pistols.

Manpower: 65.

10.—THE HEAVY BATTALION

Battalion Headquarters (12).

1 Support Company. 3 Heavy Companies.

Armament-Armament--9 A./T. Rifles. 170 Pistols. 188 Rifles. 94 Machine Carbines. 162 Bayonets. 6 2-pdr. A./T. Guns. 27 Bren Guns. 12 3-in. Mortars. 4 Besa Machine Guns. 9 2-in. Mortars.

6 6-pdr. A./T. Guns. 21 Wireless Sets. 12 Bicycles.

Manpower: 464.

11.—ANTI-TANK BATTERY ARTILLERY WING

Battery Headquarters (6).

4 Troops, each of four 6-pdr. A./T. guns (30 men per troop).

Armament-5 Wireless Sets. 16 6-pdr. A./T. Guns. Manpower: 126.

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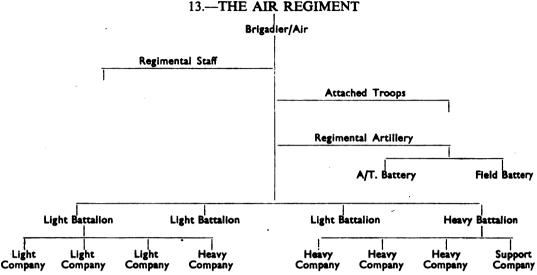
12.—FIELD BATTERY. ARTILLERY WING

Battery Headquarters (6).

4 Troops, each of two light howitzers (20 men per troop).

Armament-5 Wireless Sets. 8 Light Howitzers. Manpower: 86.

13.—THE AIR REGIMENT



MANPOWER OF REGIMENT (EXCLUDING STAFF AND ATTACHED TROOPS) 2044 ARMAMENT OF REGIMENT

368 Rifles. 742 Machine Carbines.

864 Bayonets.

135 Bren Guns. 45 2-in. Mortars. 45 A./T. Rifles.

674 Pistols.

12 2-pdr. A./T. Guns. 24 3-in. Mortars.

4 Besa Machine Guns.

24 6-pdr. A./T. Guns. 8 Light Howitzers.

APPENDIX IV

THE ORGANIZATION OF THE AIR CORPS TASK FORCE

A. A striking force-(i) The Air Armoured Regiment.

(ii) The Ground Transport Wing.

B. A gun platform—The Divisional Artillery.

A. (i) THE AIR ARMOURED REGIMENT

1.—THE SOUADRON

1 Light Tank (Squadron Leader). 1 Light Tank (Second-in-Command).

3 Light Tank (Subalterns). 3 Light Tank (Sergeants).

1 Light Tank (Recovery).

Armament-9 Light Tanks (2-pdr. guns).

Manpower: 36.

2.—REGIMENTAL HEADQUARTERS

Brigadier's Troop. Brigadier.

Regimental Staff.

Signal Troop.

Maintenance Troop.

O.C

Sergeant and Servicing Personnel.

4 Fitter Teams. 2 Recovery Tanks. 2 Spare Part Jeeps.

Wireless Sets.

O.C.

2 Tanks and Crews.
2 Armoured Cars and Crews.

2 Jeeps.2 Wireless Sets.

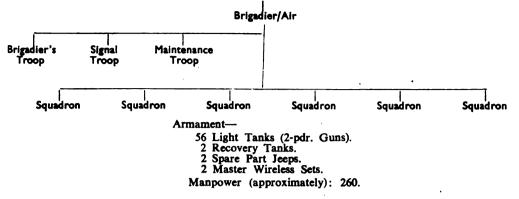
Manpower (excluding Staff): 40.

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Armament—

2 Armoured Cars.4 Tanks.

3.—THE AIR ARMOURED REGIMENT



A. (ii) THE GROUND TRANSPORT WING.

80 Jeeps. 50 Motor-cycle Combinations. Maintenance Personnel.

The Wing is intended to supplement the striking power of the Air Armoured Regiment by providing ground mobility for infantry of one of the Air Regiments of which it forms a part.

As a maximum effort one Heavy Battalion could be motorized and one Light Company provided with

motor-cycle transport.

B. THE DIVISIONAL ARTILLERY.

- 1. A./A. BATTERY.
 - 4 Troops each of three 20 mm. A./A. Cannon.

Armament-

- 12 20 mm. A./A. Cannon (Double banked). Manpower (approximately): 54.
- 2. FIELD BATTERY.
 - 4 Troops each of two 105 mm. Howitzers.

Armament-

8 105 mm. Howitzers.

Manpower (approximately): 56.

3.—THE ANTI-TANK AND LIGHT FIELD ELEMENTS OF THE DIVISIONAL ARTILLERY ARE FOUND FROM THE REGIMENTAL ARTILLERY.

APPENDIX V

THE AIR CORPS DIVISION

Major-General/Air

Divisional Headquarters Staff Divisional Artillery (cf. Appendix 4) Ist Air Regt. 2nd Air Regt. 5th Air Regt. 3rd Air Regt. 4th Air Regt. (cf. Appendix 3, 13) (As 1st /3rd Air Regts. (Air Armoured plus Ground Transport Wing, as Appendix 4 A (11) Regt. as Appendix 4 A (1)

Approximate manpower 10,000.

The Air Corps Division thus consists of an Air Bridgehead Seizure Force and a Task Force which can provide a striking force of all arms and a defensive gun platform.

APPENDIX VI

THE AIR CORPS TRANSPORT WING

The Air Transport Wing of the Air Corps would include all troop transport aircraft of the Royal Air Force. Its organization must provide for the transport of the Air Corps units with the Division as the maximum lift and must be sufficiently flexible to be able to air-lift normal army units when necessary. It is suggested that the Wing be organized in divisions, regiments and squadrons on lines parallel to the Air Corps division. The details of this are obviously a matter for a technical staff.

APPENDIX VII

THE AIR CORPS WINGS

The Air Corps wings embody the "services" of the Air Corps and are:-

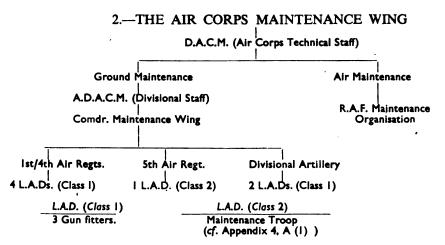
- 1. Supply Wing.
- Signal Wing.
- 2. Maintenance Wing.
- 4. Intelligence Wing.

- Provost Wing.
 Engineer Wing.
 Medical Wing.

The Ground Transport and Artillery Wings have been described separately in Appendices 3, 4 and 5.

1.—THE AIR CORPS SUPPLY WING A.Q.M.G. (Air Corps General Staff) Ground Supply Air Supply D.A.Q.M.G. (Divisional Staff) R.A.S.C. Comdr., Supply Wing R.A.F. Supply Organisation R.A.O.C Petrol Stores Ammo. **Echelons** Air Transport Parachute or Air landing at R.V.

Pre-arranged suppy rendezvous in air bridgeheads are laid on by divisional staff. "Q" staff of regiments receive calls for supplies from units in their regimental localities which they consolidate and pass to rear headquarters. Rendezvous are amended or new ones set up as necessary by the regiments during the action.



3.—THE AIR CORPS SIGNAL WING

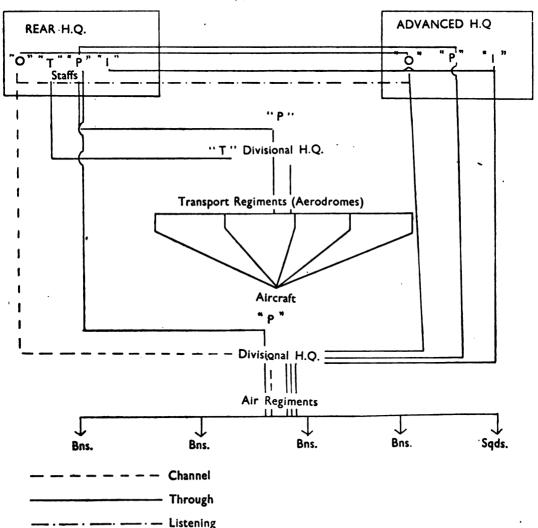
Signals personnel down to battalion belong to Signal Wing (one company per Air Regiment).

CONTROL SYSTEM

(a) HORIZONTAL

1st-4th Regiments.—Platoon, Company, Battalion, Regiment. (1 Frequency.) (Alternative squadron frequencies if necessary.) 5th Regiment.—Regimental Net. Regiment Artillery.—O.P. Frequency. Divisional Artillery.—O.P. Frequency.

(b) VERTICAL



4.—THE AIR CORPS INTELLIGENCE WING

This wing consists of intelligence specialists whose sole duty is the collection of information which they pass back from Battalion to Corps via Regiment and Division on an independent wireless frequency.

A platoon is attached to each Air Regiment.

The Intelligence Wing at rear headquarters under the direction of the D.A.C.I. is also responsible for

planning and interpreting reconnaissances.

5.—THE PROVOST WING

Under the Provost Marshal of the Air Corps, the Air Corps Provost Wing provides all normal Provost disciplinary services, plus a traffic control service.

The latter is organized into (i) Base airfield.

(ii) Air bridgehead service.

The base airfield service in close liaison with the Transport Wing is responsible for the routing and traffic control of all troops from the bases to the transport aircraft.

The air bridgehead service provides a Provost Company to each Air Regiment which, in accord-

ance with the needs of the situation, can supply a platoon to each battalion.

The principal duties of this service are:

i) To remove minor obstacles from landing-grounds.

(ii) To mark landing-grounds.
(iii) Remove gliders and parachutes from landing-grounds.
(iv) To erect weather bureaux.
(v) To provide guides for airlanded troops.

(vi) To advise operation commander on any engineer services required to improve landing-

ground.

To perform the functions, the Provost Wing troops must land with first echelons.

6.—THE AIR CORPS ENGINEER WING

7.—THE AIR CORPS MEDICAL WING

The organization of these Wings is normal but their training adapted to the special requirements of air landing. In addition to normal tasks the Engineers must include airfield construction personnel. A company of each Wing is attached to an Air Regiment, which could provide a platoon to each Battalion.

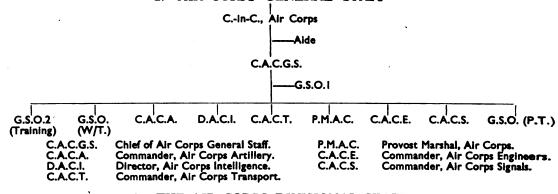
APPENDIX VIII

1.—THE AIR CORPS STAFF

(1) The Air Corps General Staff. Chief of the Staff.

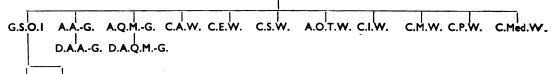
(2) The Administrative and Technical Staff. Major-General/Air i/c Administration.

2.—AIR CORPS GENERAL STAFF



3.—THE AIR CORPS DIVISIONAL STAFF

Divisional Commander



G.S.O.2 G.S.O.3.

C.A.W.	Commander, Artillery Wing.	C.I.W.	Commander, Intelligence Wing.
C.E.W.	Commander, Engineer Wing.	C.M.W.	Commander, Maintenance Wing.
C.S.W.	Commander, Signal Wing.	C.P.W.	Commander, Provost Wing.
A.D.T.W.	Assistant Director, Transport Wing.	C.Med.W.	Commander, Medical Wing.

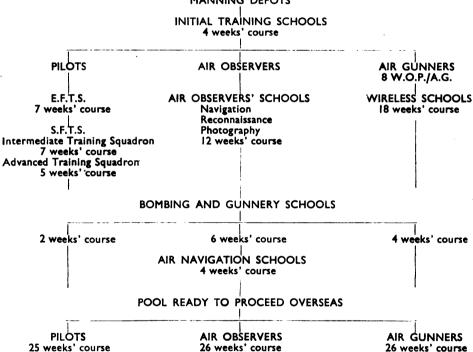
C.A.C.G.S. G.S.O.2 G.S.O. C.A.C.A Air Corps Transport Wing G.S.O.1 A.A.-G. A.Q.M.G. C.A G.S.O.2 D.A.A.G. D.A.Q.M.G. G.S.O.3 Anti-12 20 2nd Air Regin (as Ist) lst Air Regiment Brigadier Staff Major, Staff-Air Capt., (g) Air (A.-Q). Regim Anti-Tank Battery Troop Troop Troop
16 6-pdrs. Light Battalion B.H.Q. Light Company Light Company C.H.Q. Light Light Light Platoon Light Light Heavy Section Section Section

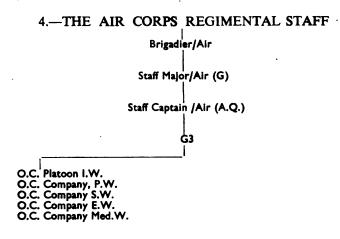
EMPIRE AIR TRAINING SCHEME

SEQUENCE OF TRAINING

RECRUITING CENTRES

MANNING DEPOTS





The British Spirit

AN ARGUMENT FOR A ROYAL IMPERIAL AIR FORCE

By SQUADRON LEADER J. F. GINNETT

"That which thy fathers have bequeathed to thee, earn it anew, if thou wouldst possess it."—Goethe.

NO how many of us, saturated with the memories of our schooldays, is the "British Empire" symbolized by the "Red bits" on that map on the wall of our classroom, a map at which we gazed only halfconsciously as the droning of the teacher mingled with the droning of the flies on hot summer afternoons? We have been to the cinema and there we have seen pictures of vast acres of wheat apparently as large as an English County; pictures of huge herds of cattle and sheep; of giant rivers and mighty waterfalls; of ranges of majestic mountains towering, snow-capped, to almost fantastic heights; of new and prosperous cities of gleaming concrete, and of old and shabby cities of stone, of wood, even of mud; we know, too, that the title of British Subject is borne, sometimes perhaps in ignorance, by men of every colour, race and creed; and that as the earth spins and the sun rises and sets, somewhere some of those subjects are working, for work never stops in the British Empire. These things we know, and yet we have no mental symbol with which to embrace this strange conglomeration of men and places and things, except those "Red

Some of us can go further and give the dates on which, and the means by which, those "red bits" became part of this strange adventure of the human spirit, the British Empire. For strange adventure indeed it is. Started almost accidentally, continued as expediency and economic necessity dictated, it has grown into something that has for the world to-day a value far greater than its builders ever foresaw. It is not merely a scattered assemblage of tracts of the earth's surface; it is not merely an economic unit; it is not only a political entity; it is each and all of these things, but it is also something much more. It is a world-wide diffusion of the English Spirit.

It is not easy to define the English Spirit. It is not easy to define anything that is important. The English record is a record of the development of the human virtues, tolerance, charity, humanity and fair-dealing. Black spots there are on this record, to be sure, and things best forgotten, but on any broad view it is the exercise of the human virtues that has shaped the destiny of England, has encouraged the growth of the British Empire, and has permitted the final establishment of the British Commonwealth of Nations. At no time in the history of that growth have the political and legal ties that bound the Commonwealth together been so loose and free; and at no time have the intangible, undefinable and insubstantial claims of a common ideal cemented that Commonwealth so formidably. There is a sense

of unity in the whole fabric. At the outbreak of the present war, no compulsion to enter the struggle could be put upon the Dominions by this country, and yet the whole Commonwealth rose to defend not only the Mother Country but the English way of life. The whole Commonwealth, save one small part of it, Eire. The youngest member defaulted. One cannot help supposing that this was indeed the folly of youth, that preferred to hurl defiance at the world rather than surrender one jot or tittle of its new-found independence. That relatively small default had many uncomfortable consequences for the rest of the Commonwealth in the conduct of the war, but never was it suggested that any form of force should be used to compel compliance with the needs, often desperate, of the conflict. The Commonwealth could recognize and respect independence, even at such moments, and even while deploring the impetuous short-sightedness of the decision. It is this sturdy independence in the British that makes them so important and so valuable an element in the world. You cannot dragoon them. You must not try their patience or their tolerance too far. They will suffer the restrictions and interference of Government only with resentment and grumbling. It is held to be the inalienable right of all the British to be "agin the Government." And yet the need for coherent government is recognized. There is indeed no people on this earth who can govern better than the British, and their skill in the art of governing is founded in the main on their own insistence on individualism, and their willingness to allow and respect it in others. The British attitude is neatly summed up in the words of Mr. A. P. Herbert-

"He's not my sort, but pass the port. Thank God there's room for us all."

It may seem to many a strange thing to start an argument for a Royal Imperial Air Force with a digression, that must be incomplete, on the British character, and yet it is not so. For the British Empire—now the British Commonwealth of Nations—is the result of the operation of that character on the circumstances and facts and people with which it was faced. The English spirit has become the British spirit, and has found its justification in the unity of the Commonwealth to-day. That unity will remain so long, and only so long, as the peoples of the Commonwealth value the British way of life. The Commonwealth exists not merely for the preservation of an England, or a Canada, or an Australia. It exists so that the men who inhabit those countries may live in the British manner—the manner that will allow them to

be what they are. Englishmen, Scotsmen, Canadians, Australians, New Zealanders, South Africans differ in many things. In one thing only are they fully at one, their allegiance to the ideals that are at the hard core of all their thinking. It is therefore on such a foundation that it may be possible to build a lasting structure. Let us not lose sight of the underlying reality of this Commonwealth. Let us not forget that it was born of the British spirit, has lived and been nourished by that spirit, and will pass, as other empires and states have done, into the grey remoteness of history only when that spirit dies within it.

We are entering now a new age, an age in which the stern force of the Russian achievement, the alert acquisitiveness of our American Allies may make it difficult for us to steer by the old accustomed stars. It is to be an age of challenge. We cannot rest upon our past. The great Empire of Rome fell because it lapsed into a smug reliance upon past glories. A passive acceptance of past splendours may make of those very triumphs a death-trap. The salt of civilization is the spirit of adventure, and without that salt civilization must lose its savour and ultimately decay. The vigour of civilized societies is expressed in their willingness to adventure beyond the proven safeties of

We shall be compelled in this new age to think in new terms, to develop new integers of thought. There is, perhaps, no single new term that must have more effect upon our thinking than Air Power. To see this it is only necessary to point out how the fortunes in this present war have hung again and again upon the relative air strengths of the opposing forces.

Air strength is not inevitably linked to quantity, for quality and intelligence can offset a numerical superiority with devastating results. The important consideration is that it is no longer possible for an army, or a navy, or any country, even to survive aggression, if the aggressor can bring to bear a decisive superiority in the air. This can only mean one thing -that the future defence of the British Empire must be a defence planned and founded upon the strategic use of the Air. The Royal Navy, which has so long and proud a record as the bulwark of the Empire's liberty, is helpless to-day without the aid of air power. No longer can the Navy in isolated splendour on the oceans and the seas keep open the green and foam-flecked highways of the Empire's commerce. To say that is not to disparage the Navy, for indeed no achievement is greater or more glorious than that of the men who have gone forth so gallantly upon the waters of the



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THE LATE WING COMMANDER G. P. GIBSON, V.C., D.S.O., D.F.C.



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GROUP CAPTAIN G. L. CHESHIRE, V.C., D.S.O. AND TWO BARS, D.F.C., who has recently taken up an appointment with S.E.A.C.

carth to face and endure danger and hardship in the execution of their duty. But all their gallantry and all their noble achievement cannot offset the fact that the defence of the British Empire can no longer be built on naval

strategy, unbacked by air power.

If this be true it follows that all former plans for the defence of the Empire are useless. And it follows also that the strategic use of air power may throw into prominence parts of the Empire which formerly had no special significance, or relegate to a relative obscurity some strong-point until now regarded as allimportant. For instance, all our ideas of distance must undergo, are indeed undergoing, a fundamental change. It is rapidly becoming clear that no great difference exists whether our enemy be 200 or 2,000 miles away. The "red bits" which seem, on the map, to be separated by such vast spaces, are shrunk together. Their need for mutual protection and support grows greater, and their dependence upon each other is now much more than a matter of economics or politics. For that same juggling with distance enures to the harm or benefit of the whole world. All places on the earth's surface are much nearer together than ever before. Distance may still lend enchantment to the poetic mind, but it creates no illusion for the strategist in air power. War is no longer an affair solely of armies and navies locked in combat. The long tentacles of air power, reaching far out over the heads of the men in the front line, can strike at the very nerve-centre of defence and reduce those armies and navies to impotence. The heart of any nation now lies bare to the attacker. The heart must be protected, and one method, at least, of protection is dispersal. Let there be, as it were, not one heart, but many.

In this respect the Empire is in good case. The far-flung and dispersed character of that Empire, which for each individual member State of the Commonwealth may well constitute a grave danger, can be made a source of great advantage. An air plan that considered the Commonwealth as a whole, that was designed to afford protection to each and every member, and to permit the quick and easy swing of the total air strength from one point to another as occasion demanded or peril threatened, would turn weakness into strength. No one State in that Commonwealth could stand alone in the event of attack by a major enemy power. In this war the Mother Country, deserted and unaided by the Commonwealth, could not, from her own resources, have staved off defeat. So, too, had attack been made on

any single member of the Commonwealth that member must have succumbed to the aggressor, were aid not forthcoming in some sort from its fellow members. It is indeed a matter of the common weal.

The preparation and concert of such an air plan is not only a matter for air staffs and must. to be effective, go far beyond the obvious questions, such as the size and type of aircraft required, or the position and use of bases. So swift in action, so terrible in result, is modern air attack that a whole line of bases can be made useless by an attack on some source of supply or some industry perhaps thousands of miles away. An air plan embraces the aircraft, the men that design them, the men that make them, the men that fly them, the bases from which they are used, the ability to supply those bases in the face of a fierce determination to prevent it, the power to expand and extend from those bases, the scale and direction of attack. These are but a few of the factors which must be taken into account in the construction of such a plan.

Have we not ample evidence of this now? We cannot yet know to the full, but can only guess at, the appalling destruction wrought in German industry by Allied bombing. Germany's industry has been slowly disembowelled, while her troops stood helpless, almost within sight of victory. Her forces are now being driven back into the shattered and smoking arsenal. The main instrument of her undoing was the air plan. When the full story of the making of that plan comes to be told many strange facts

will see the light.

We have in this war seen air power in action. We shall do well to remember that we have seen only the beginning. The mists of the future still hide developments even more massive and far-reaching than those of the past ten years. Those who laugh now at the fancies of Seversky may live, if they are lucky, to laugh their hollow laughter before the empty ruins of a civilization doomed by their mockery to destruction. We have no excuse for underrating either the value or the effects of this satanic weapon. And if we have no excuse for underrating the meaning of air power, we have also no excuse for ignoring the first principle of its successful operation, unity of command. Remember that we are here discussing, not the defence in particular of Australia, or of Canada, or of the Mother Country, or any other part of the Commonwealth; we are discussing the air defence of the whole structure. A system of separate schemes for the defence of the separate States of the Empire is not the same thing. Such a



system presupposes the sufficiency of each plan for the defence of the State that formed it. In so far as any of those separate plans take into account, and rely upon, the existence of similar plans in other States of the Empire, they are acknowledging the essential unity of the whole edifice. An attack upon any part of the Empire is an attack upon the whole. The thing must stand in its entirety or fall piecemeal to the blows of successive aggressors. The power of the Commonwealth resides in its unity; that unity disrupted, the power evaporates to the empty skies. The adventure ends.

It is clear that the future defence of this Commonwealth from aggression must be founded upon the strategic use of air power. It is clear that this strategy must in turn be based upon an air plan embracing the defence not only of the parts but of the whole. Is it not also clear that if there is to be one plan there should be one planner—the Chief of the

Imperial Air Staff?

This war, which has taught us so painfully but so successfully many new secrets of the bestial art of making war, has shown us also with what ready and eager enthusiasm men from all parts of the Commonwealth, indeed from nearly all the countries of the world, have been willing to serve under the command of those who are not their countrymen. Has not the Commonwealth been willing to entrust the supreme command of the greatest and most complex invasion of all time to an American General who had not, before this conflict, held high command in any major war? And has not their trust been faithfully, steadfastly and skilfully performed to the great and lasting discomfiture of the enemy? The men of the Dominions Air Forces, serving often thousands of miles from their own country, and in remote and lonely places, have created for themselves a shining record of nobility, self-sacrifice and devotion to duty that has never been surpassed. The man ultimately responsible for all their air operations is an Englishman—the Chief of the Air Staff.

This willing subordination of national independence to the dictates of the hour is proof enough of the recognition of the value of unity of command. It is here suggested that the years to come, when the fighting stops and the energies of the Commonwealth are bent to the task of rebuilding, will still hold the same need for that unity. It has been well said that the price of peace is eternal vigilance. The savage and remorseless claims that war makes upon us shake us without choice from apathy. Vigilance is forced upon us, and we may gaze,

clear-eyed and with hardened resolution, on a named and obvious enemy. But in peace there is no such uniting factor. Our several desires and separate devices rise in bewildering strength and profusion. Our attention is distracted to a hundred threats, a host of potential enemies. We lose sight in the confusion of the one common enemy.

A Royal Imperial Air Force will not of itself guarantee the security of the British Commonwealth of Nations to all time. There would perhaps be no great argument for the building of it, if the purpose were merely the preservation of that Commonwealth as a political or economic block. It is not enough that the member States of that Commonwealth should feel vaguely that they belong to each other, and that their continued "de facto" existence is dependent on their military unity. They must realize why they are members one of another. They are trustees of the British spirit, the spirit of freedom, humanity, tolerance and justice. It would indeed be a dark day for the world if

that spirit faded from the earth.

As the hour of the final destruction of the Fascist barbarian grows daily nearer, there is much talk of the need for international co-operation and organization for the maintenance of international peace and security. The conscience of mankind has been stirred to demand a new world order, that shall prevent a recurrence of the present conflict. The creation, and for many years the maintenance, of that new order, if there is to be one, must rest upon the broad shoulders and the goodwill of the three Great Powers, America, Russia and the British Commonwealth of Nations. Led by these Great Powers the nations of the world must accept a limitation on their rights of sovereignty selfishly to engage in acts of predatory aggrandisement at the expense of other nations. In every civilized country there are laws, respected by the citizens of that country, to prevent the harsher acts of predatory personal aggrandisement. The existence of those laws constitutes a limitation. welcomed by all save the criminal, on the freedom of action of the individual. So must it be internationally. All the nations of the earth, including the three Great Powers themselves, must accept some measure of limitation. If they will not, the hope in the hearts of mankind must fade and die in disillusion. In the shadows of the future lurks a threat of death and destruction so terrible and so bloody that our present conflict will pale into insignificance. The small nations and the lesser peoples will starve or be swallowed up, while the Great Powers are locked in a desperate struggle for ascendancy.

Here then is yet another reason for a Royal Imperial Air Force. The building of such a Force must involve the surrender of a certain measure of independence, not only by the member States of the Commonwealth but also by the Mother Country. No one Dominion or Colony, nor even this Country, could claim to be the head of such an organization. It would be a fine and noble lead, if all the States of the Commonwealth, in the very hour of their triumph, should voluntarily surrender a measure of the very independence for which they had been fighting, in the interests not only of their own security, but of all the nations of the earth.

There could be no greater or more splendid justification of the British spirit, that spirit which has done so much, perhaps more than any other, for the cause of religious, civil and political liberty. It has done it by an obstinate insistence upon the sacredness of individuals. Fiercely and firmly the British people have refused, for seven hundred years, all attempts to fashion them and school them to a pattern, and have in those seven hundred stormy years evolved the principles of freedom. It is not without significance that it was the English law which developed the idea of Equity, by which the rigid justice of the Common Law might be tempered and bent to do special justice in the particular case. From the first great step of Magna Charta the British have proceeded to strip their King of all his power. But they have kept their King. They have given to the world the idea of Parliamentary Government, and have in their own Commonwealth so developed it that all nations and peoples now aspire to it, even those where the standard of individual liberty and knowledge can make of it only a cloak for exploitation. Hitler, with his Reichstag, could not ignore the concept, and was forced at least to pay lip-service to it.

All men desire freedom. The idea of freedom, of an individual freedom which nevertheless accepts willingly the impact of other individual freedoms, is the great British spiritual achievement. Whatever other things may be remembered of the British Commonwealth, it will go down to history as the manifestation of that spirit. And because of this great heritage, no nation or race or people is better fitted to lead the world in the surrender of a measure

of freedom for the common good.

When our present trials and tribulations are one with the general impersonality of history, some teacher in some future land may well discourse of them, and us, to his class. Standing before a map of the world in the twentieth century on which are shown the "red bits" he

may, as his droning mingles with the droning of the flies, explain to his pupils that it was the men who formerly peopled "those red bits" who hewed and hammered and forged, out of the hard core of human experience and suffering, the principles of freedom the world had grown to accept as the inalienable right of every human being. And then—who knows—he may be able to add words like these: "In the opening years of the twentieth century there came upon these peoples a great war. All that they cherished and held most dear was threatened with extinction. All they had striven for, fought for and laboured to build, and which was manifest in their British Commonwealth of Nations, was faced with the direct peril it had ever encountered. But the British spirit, the unseen architect of that Commonwealth, rose undaunted to the occasion, and with the help of their American and Russian Allies, and of all free men in the world, they drove the barbarian from their gates and utterly crushed

"Then it was that fate presented them with the noblest opportunity of all their long and chequered history. The conflict from which they had just emerged, battle-scarred and weary, had seen the first full strides in the development of air power. It is held by many that it was this development which did more than anything else to make clear to them their own essential unity. Whereas before they had always claimed for their Commonwealth a political unity, they saw then that the unity was a unity of common experience and common ideals. And they saw, too, that such future as their Commonwealth might have was a future dependent upon the right use of Air Power.

"Seeing these things they took counsel among themselves and came upon their finest decision, that decision of which we are to-day the careless, happy heirs. They buried their superficial differences. They surrendered, in the name of their unity, each a part of their separate and hardly won freedom, a sacrifice not easy for such fiercely freedom-loving people. They recognized that their several causes were in fact one cause—the cause of Freedom. For the sake of that cause, and fortified by the British Spirit which had been the moving force in so much of their history, they used their mightiest weapon for the common good of Manknd. The first step they took in the great task they had set themselves was the formation of a Royal Imperial Air Force. The history and the feats of this splendid service. . ."

But here the flies, which flew long before mankind had discovered the art, would perhaps

have won the battle for the pupil's attention. In such wise do all succeeding generations receive the legacies, spiritual and political, of their ancestors, who gave in toil and sweat their bodies and their souls to the building of the heritage.

The Empire Air Training Scheme

BRITISH COMMONWEALTH AIR TRAINING PLAN)

TERMANY showed how she intended to wage this war from the very start. The first move, when she attacked Poland on 1st September, 1939, was by the Luftwaffe. Before Polish troops had been fully mobilized German bombers bombed to destruction almost all Poland's big air bases. Flying schools, airfields, factories around the airfields were persistently attacked, with the object of paralysing the Polish ability to sustain air warfare. The Luftwaffe's surprise onslaught succeeded. Polish squadrons were either disabled or cut off from their sources of supply and the German bombers were free to turn their attention to the bombing of Warsaw, the immobilizing of Polish armies by smashing railway junctions, roads and motor transport, the terrorization of refugees from bombed cities, towns and villages. The German plan had worked. It was clear to the world what immense store Germany set upon air mastery.

Now, although the actual invasion of Britain seemed a still distant threat, severe air raids were fully envisaged. And in the event of air attack, what else could be expected than that the Germans would follow their former successful tactics, with raids calculated to put British airfields, aircraft factories, and flying schools out of action? On her part, Britain did not share the enemy's expectation that the war would be a short one. But for the successful prosecution of a long war it was clearly even more desirable to provide for the training of air crew far from the risk of enemy interference.

To balance the industrial productive effort in aircraft planned to meet a long-term war programme Britain needed pilots, air gunners, wireless operators and observers in large numbers. If this training had to be undertaken in the United Kingdom, new airfields would have been needed. But the total area of England and Wales is only 58,000 square miles, half of which is physically unsuitable for the construction of airfields, while of the remainder a considerable area is rendered unsuitable for flying owing to the existence of the electric grid. There was a large demand for airfields needed for opera-

tional purposes. The air space likely to be available for training was therefore small—nothing like enough for the expansion required in air crew, if the R.A.F. were to be built up on a three-year plan.

It was to overcome these difficulties and meet these demands that the Empire Air Training Scheme, later known as the British Commonwealth Air Training Plan, first took shape and substance. While it was organized rapidly to cope with the rapidly increasing demands of the war situation, it had not, of course, sprung from nothing overnight. For some time air training arrangements had existed in Canada, Australia and New Zealand and had been available in Southern Rhodesia as a supplement to R.A.F. home-based training.

The Canadian Government, following air missions from Britain to Canada in May and July, 1938, offered to train pilots for the Royal Air Force. Pupils were to have elementary training at civil schools in Britain and further training in Canadian establishments under Canadian control. Britain was to supply instructors. The British Government accepted this offer and the scheme was scheduled to begin in September, 1939.

In Australia a "trained cadet" scheme had been in operation before 1934. Under this arrangement Australian pilots trained in Australia were given short-service commissions in the R.A.F. At the expiry of the commission they returned to the reserve of the Royal Australian Air Force. On the outbreak of war the Australian Government planned to make a further contribution to Imperial Defence by developing the capacity for aircraft manufacture and by sending complete R.A.A.F. squadrons. New Zealand's capacity for industry was more restricted. Early in 1939, therefore, the New Zealand Government decided that their most effective peace-time contribution would be to train pilots for the R.A.F. at the rate of 220 a

Southern Rhodesia, following a request from her Prime Minister, had been visited in 1936 by a R.A.F. mission to advise on the building up of a Southern Rhodesian air unit. It was to be available either for the defence of its parent country or as a contribution to Imperial Defence. R.A.F. officers were subsequently lent and the first flight of the unit was ready by July, 1938.

All these contributions, helpful though they were, could not make good the requirements of an ultimate Air Force based, in the initial estimate, on a monthly production of 2,550 aircraft. That force would need to be backed by about forty-five Service Flying Schools and forty-five Elementary Training Schools, turning out an overall total of 19,500 pilots a year, and by a large number of schools for crew training. The existing R.A.F. organization had fourteen Service and fourteen Elementary Schools, and it was hoped to provide another five of each in the United Kingdom. It remained to locate at least twenty-five Service and twenty-five Elementary Schools, plus schools for crew training, where facilities for air training could be provided with safety and at short notice.

Locations previously considered for training schools included Canada, India, New Zealand, Australia and South Africa. Their suitability had been seriously examined, but there were few concrete developments when Mr. Bruce, High Commissioner for Australia, made his historic proposal on 22nd September, 1939. It was that each Dominion should furnish an air crew contingent for service with the R.A.F., individual Dominions providing elementary training, but advanced training being concentrated in Canada. It is striking testimony to the solidarity of the British Commonwealth, if such testimony were needed, that Mr. Bruce's suggestion was accepted without delay by Canada, Australia and New Zealand.

Choice of Canada for air training was founded on a variety of cogent reasons. Tradition played a part. Air training had been successfully carried out in Canada during 1917-18. Besides being safe and not subject to serious dislocation in war-time. Canada possessed a virtual guarantee of security in the proximity of the U.S.A.; should communications become difficult, supplies might well come from there. Another advantage lay in the fact that Canadian instructors and maintenance staff would be available, so avoiding disorganization of R.A.F. squadron establishments. As Canadian aircraft industries developed it would also mean that British factories could concentrate largely on producing operational types. Finally, it was hoped that Canadian recruiting would be immediately encouraged. Transporting the trained

men would, of course, be much easier from Canada than from Australia and New Zealand.

In September, 1939, as Sir Kingsley Wood, then Secretary of State for Air, announced, " an outline of arrangements for the rapid expansion on a co-operative basis, of the training organization for pilots, observers and air gunners required for the considerable enlargement and then for the maintenance on the enlarged basis of the air forces of the respective countries" was agreed in principle by the Canadians, Australian and New Zealand Governments. 17th December the agreement for carrying out the Empire Air Training Scheme came up at Ottawa for signature by representatives of these governments and by Lord Riverdale as head of the British Air Training Mission. Remaining in force until 31st March, 1943, it was destined to make Canada the "aerodrome of democracy."

One change from the original conception was that a considerable amount of advanced training should be carried out in Australia and a certain amount in New Zealand, in order to make use of existing facilities; but the major portion would still take place in Canada, with Australians, New Zealanders and pupils from Britain and Newfoundland working side by side with Canadians after undergoing elementary training in their own countries. The scheme laid down that Canada should set up thirteen Elementary and sixteen Service Schools; Australia nine Elementary feeding seven Australian and two Canadian Service Schools; New Zealand three Elementary feeding two New Zealand and one Canadian Service School. This provided the total of twenty-five extra training schools needed to bring Britain's training output up to the initial requirements of her ultimate Air Force. Moreover, as a result of the limited decentralization in advanced training, Australia and New Zealand would have within their frontiers a considerable number of fairly modern types of aircraft representing a great access of strength for their own defence in event of any emergency.

The magnitude of the scheme, if not the complexity of its organization, can be judged from the scale of training equipment. In Canada about 4,000 aircraft were to be in constant use, in Australia 1,750 and in New Zealand a further 400. When in full swing the organization was planned to complete an annual output of approximately five-ninths of the flying personnel required by the R.A.F. Ground crew of seventy-two different categories were to be trained in addition. It was agreed that Britain should send for pilot and observer training in

Canada numbers not exceeding ten per cent. of the intake of the Elementary and Air Observer Schools in Canada, with the balance of cadets to fill any deficiency in the supply from Australia, New Zealand and Canada itself. Fully trained cadets were to be identified with their own Dominion either in organized units or in such other ways as the Dominion Governments might agree. Altogether, Canada would maintain sixty-seven training schools, including thirteen Elementary, sixteen Service, ten Air Observer Schools, ten Bombing and Gunnery Schools, four Wireless and two Air Navigation Schools. In addition to twenty airfields being enlarged, sixty new ones were to be constructed. The effective functioning of this vast organization demanded no less than 40,000 ground personnel in permanent employment.

Operation of the Empire Air Training Scheme was entrusted to the Canadian Government, which deputed the Royal Canadian Air Force to carry out the executive work, while a standing committee of Air Council was appointed to keep in touch with all developments. The problem which faced the R.C.A.F. was a formidable one. In 1939 it contained about four thousand personnel only and its equipment consisted of a mixture of British and American aircraft, some suitable for training but none for war purposes. Its permanent airfields comprised small but modern stations at Ottawa and Trenton in the east and at Calgary in the west. In addition, it had its old lastwar training station at Camp Borden. For the rest of its peace-time operations it made use of civil airfields, temporary landing-grounds and staging points. On the administrative side there was a small headquarters and an equipment depot in Ottawa. R.C.A.F. commitments now included air patrol of the Western Atlantic routes and Canada's own air defence in addition to the training scheme.

A supervisory board was appointed to watch over the progress of the scheme. It included the Chief of Air Staff of the R.C.A.F. and representatives of Great Britain, Australia and New Zealand, together with a financial adviser to the Canadian Government, under the chairmanship of the Canadian Minister of National Defence, Mr. Norman Rogers. The appointment of the Financial Adviser, whom all Governments were entitled to ask for information, was both an incentive to economic administration and a very good earnest of the Canadian Government's desire to administer the scheme in a businesslike manner. As to costs, the British Government's share comprised contribution in kind of aircraft, airframes and aero-engines

sufficient to provide Ansons, Battles, Harvards and Moths for the initial equipment and immediate reserve, the cost of their transportation to Canada and, of course, the pay, allowances and maintenance expenses of air crew from the dates of their embarkation in Canada for service with or in conjunction with the Royal Air Force. Canada was to bear the cost of transporting aircraft in Canada and of all initial training and elementary flying training. The remaining expenses of advanced training and administration were apportioned between the three Dominions. The total figure for a threeyear plan was estimated at \$650,000,000; owing to the expansion of the scheme it worked out in practice at \$824,000,000 for the joint expenditure of all countries.

Obviously, whatever the material resources available, such a plan could not come to fruition without immense goodwill and unselfish co-operation from all the parties concerned. In the beginning indeed it seemed not so much a plan as an act of faith. One key worker, leaning back from his complicated blue-prints, was heard to remark: "If this darned thing works out it will be one of the greatest coincidences of all time." Goodwill, however, was not lacking. Perhaps the most conspicuous effects of it could be seen in the harmonious working of the civilian contract system. When hostilities began twenty-two Civilian Flying Clubs in Canada had offered their assistance to the R.C.A.F. With the establishment of the Empire Scheme companies were organized by these clubs, under contract to the Canadian Government, to operate all the Elementary Schools in Canada; in similar fashion civilian air transport companies undertook to operate the Air Observer Schools. This method of adapting the available equipment and skill, such as that of experienced bush pilots, to Service use enabled the plan to get off to a much quicker start, besides lowering staff requirements and running costs.

Shortly after being appointed Director of Recruiting for the scheme, Air Marshal W. A. Bishop, V.C., gave an address outlining the training which pilots were then to complete before their real operational work began. The full sequence of training can be seen in the chart facing page 75.

"A young man joining here in Toronto," said the Air Marshal, "would be sent to the Initial Training School in the old Eglinton Hunt Club and there receive a thorough grounding in discipline, and elementary instruction in ground subjects, as well as some knowledge of the history and traditions of the Air Force. On completion of this course, he is

selected for training either as a pilot, air observer or air gunner. The course lasts four weeks.

"His next move, if selected to be a pilot, is then to an Elementary Flying Training School. Here he has his first actual flying training, which includes instrument flying and elementary navigation as well as further instruction in ground subjects. These schools are chiefly flying clubs, conducted by civilians, as this proves to be the most efficient method for this elementary training. If, after fifty hours' flying, for the most part on Fleets and Tiger Moths, the R.C.A.F. inspector considers that any pupil is not likely to make a good pilot, then naturally this instruction will be discontinued and the pupil may be enlisted in another category.

"If he is accepted as a good pilot prospect the pupil's next step is to a Service Flying Training School, when he does a further fifty hours of flying at an intermediate squadron on service-type single-engine and twin-engine aircraft, such as Harvards and Ansons. During this period a great deal of time is spent on instrument flying, air navigation and night flying; and on successful completion of this course he is awarded his pilot's wings.

"The next step is what we call advanced training in the advanced squadron of the same Service Flying School, and the purpose of this training is to prepare pilots for employment in fighter, bomber and army co-operation squadrons. In this school the pilots are given an additional fifty hours' flying, thus bringing their total flying time to approximately 150 hours.

"When these pilots go abroad they receive further training in a Group Pool prior to being posted to squadrons on active service, thus bringing their total to about 200 hours before being called upon to take part in operations. In the last war the average flying time of a pilot who reported to a squadron in France was twenty-five hours, some, in the earlier stages of the war, having as little as ten to fifteen hours to their credit. I know in my own case I was flying at the mouth of the Thames, with only fifteen hours' flying, looking for Zepps which, thank God, never came my way!"

Air Marshal Bishop's sketch may be applied, with occasional changes of detail and modifications of time-table, to the scheme as it worked out in the other Dominions. Such facts as acclimatisation (wherein Canada's winter posed a problem equal to any), map-reading, differences in visibility and black-out conditions might have been expected to cause uneven performance, especially in the later stages, but the quality of output was consistently high. Final

touches, whereby a pilot accustomed to the clear and spacious skies of the prairies could be prepared for the industrial murk of the Ruhr, were given at Advanced Flying Units in Britain. Everything was done to ensure that air crew were perfectly trained before they went into battle, for on training, in the final analysis, depended the superiority of Allied Air Forces over those of their enemy.

The course of the war in the early summer of 1940, however, was hardly favourable to a scheme which had begun only in April and was not scheduled to operate at full strength until April, 1942, even if it were then to ensure overwhelming Allied air superiority. When Germany was knocking out Denmark, Norway, Holland, Belgium and France in quick succession the training scheme was yet barely in gear. Canada, it is true, had sent over a token contribution of three squadrons of R.C.A.F. trained airmen, but apart from the work of her Initial Training Schools was still largely concerned with training instructors to supplement those provided by the R.A.F. In Australia, four civiloperated half-size Elementary Schools were open and one Service School. New Zealand had two Elementary and two Service Schools at work, but they were below full strength. Time opposed a grim threat to the success of the whole purpose of the plan. There was but one answer to it—acceleration.

Accordingly, in May, 1940, Empire Air Training Scheme organization was thoroughly overhauled by the Canadian Government under Mr. Mackenzie King, with Major C. G. Power as Minister for Air. The task set was to develop all the airfields to be used in Canada before the winter frost of 1940, and to build in 1940 all the buildings originally scheduled for the end of 1941. Britain had to suspend shipment of aircraft and engines for a few months after the fall of France, so that there was also the problem of getting these. This was met by placing orders in the U.S.A. for new and used aircraft, by taking over those orders which had been placed by the French Government, and by the manufacture in Canada of Anson training aircraft. Sites, construction, equipment were Throughout the summer of the chief battle. 1940 it was fought with picks and shovels, rollers and bulldozers, while the training of instructors and huge organization of industry went ahead with incomparable Canadian drive. What happened in the factories, on the assembly lines, wherever men heard the call to redoubled effort, is one of the inspiring tales of a people at war. The end in view was to complete the whole scheme, increased in scope

by 25 per cent. in mid-1941 instead of in 1942. Of the many everyday problems, arising from the employment of men and machines in new surroundings, which had to be overcome before efficiency could be ensured, fire prevention may be taken as a typical example. Fire risk in Canada is a problem not easily appreciated in Britain where high humidity and prevalence of brick construction largely counteract it. In Canada, however, the low humidity, high percentage of wood used in construction, central heating which renders all materials dry and easily combustible, coupled with the high content of static electricity in the air all make the hazard of fire a very constant one. Fires started from the most insignificant causes. Oily rags left overnight in overall pockets caught fire from spontaneous combustion. Other causes were faulty electric wiring, spilling of fat on cooking ranges, insufficient insulation of stove pipes and the handling of petrol with inadequate earthing devices.

In the R.A.F., apart from protection against air-raid fires, fire protection concentrated mainly around aircraft. In Canada an air force station, in size larger than the average town and containing a large amount of very valuable equipment, including much that was highly inflammable, required a complete fire brigade of its own. It was apparent that a unit fire service would need full-time supervision, and the R.C.A.F. wisely decided to provide permanent and experienced fire-fighters at each station. These were recruited from civilian fire brigades and a number of fire chiefs were given commissions to provide a fire-prevention officer in each Command. As personnel and equipment thus obtained were insufficient to provide fullscale protection for each station, arrangements were also made for local fire brigades to assist as required. Other problems, such as the allimportant one of supply organization, were met with the same enterprise and thoroughness.

Results were remarkable. Schools opened ahead of schedule—forty-eight were operating before the end of 1940 instead of the thirty-six anticipated. Twice as many air crew were sent overseas in 1940 as had been intended. This was achieved partly by condensing certain training periods, but not at the cost of a high total of casualties. In that year there was one fatality for every 10,000 hours flown. In Canada the first output from a Service School graduated on 24th November; in Australia on 18th November. The response to recruiting in both Dominions emphasized both the need for and value of this accelerated programme. In Australia, for instance, there was by the end of

1940 a waiting list of 7,679 candidates for air training.

Australia's difficulties, different in kind from Canada's, were met with no less vigour. Her programme was to operate five Initial Training Schools, nine full Elementary, seven Service, four and a half Air Observer Schools, four Wireless Operator/Air Gunner Schools, four and a half Bombing and Gunnery Schools, and three Air Navigation Schools. She had agreed also to train air crews for her own requirements for home defence outside the Empire quota, involving an extra 25 per cent. of pilots and 10 per cent. of observers. To cope with the vast distances involved and their effect on pupils' movements, the scheme was planned not on a functional but on a regional basis. As far as possible the trainee was enlisted, trained and embarked in his own State. The typical Australian characteristics of native wit, independence of outlook and cheerful optimism, made Australians naturally suitable as fighting airmen. On the other hand, the fact that the lives of many potential air crew had been spent more or less in the open made it necessary to institute a preliminary training scheme with particular emphasis upon physics and mathematics. Under the accelerated programme the Elementary Schools had a consistently good output. After Britain had suspended shipments of aircraft, Australia's small aircraft industry immediately produced a plan to manufacture trainers such as Tiger Moths and Wirraways. As a result of outstanding effort sufficient of these aircraft were always available to keep pace with training plans and not one pupil was held up for lack of aircraft.

New Zealand's peace-time contribution of training 220 pilots a year for the R.A.F. had developed under the Empire Scheme into an annual output of 650 pilots, 300 observers and 350 air gunners. After pre-entry training and passing through the Initial Training and Elementary Schools the bulk of her cadets took Service flying training also in New Zealand and were then sent either to Britain or to units in the Far East. The remainder went to Canada for a Service flying course. For a smaller country this was an ambitious programme; it involved doubling the air personnel in New Zealand and almost trebling the number of New Zealand airmen serving overseas.

An additional measure in accelerating the Empire Air Training Scheme was the transfer of R.A.F. training schools to Canada, and to South Africa. This possibility had been considered in September, 1939, coming up with renewed urgency in June, 1940, when the close

threat of air attack on Britain hampered air training, especially in navigation. Such handicaps as the restriction of training flights in regard to area, height and weather conditions, in order to leave the air clear for fighter operations, added to the vulnerability of training aircraft and airfields, especially, at night, of lighted airfields near to factories or store depots, which could be overcome only by moving schools right out of the combat area. In July the British Government asked that Canada should accommodate fourteen schools by the autumn of 1940. Canada agreed, with the proviso that these schools should come under the R.C.A.F. and that there should be no hold up in the supplies of aircraft for developing the Empire scheme according to plan. The transferred schools were to train British cadets from Elementary Schools in Britain.

While the Battle of Britain was being fought all except two transfers actually in progress were delayed in order to avoid taking away the R.A.F.'s last reserves at a critical time. The first of the schools opened in Canada on 7th October. In December, transfer was speeded up again, but on a different footing. Instead of transferring bodily to Canada, new R.A.F. training schools were opened there extra to units in the United Kingdom. In February, 1941, Canada's own desire to undertake more training brought about an agreement to form two "transferred" Elementary Schools there in addition. These were Service operated and were followed by another six, set up before the autumn of 1942. Fortunately the aircraft supply for Elementary Schools was satisfactory. There were considerable difficulties in equipping all the Service schools, but the position was eventually eased by redistributing aircraft between the original Empire Scheme and the transferred schools. Later, operational training units also were established in Canada, partly to assist in providing crews for ferrying aircraft built in Canada or U.S.A. across the Atlantic.

The request of the British Government that four R.A.F. schools should be transferred to South Africa was accepted in principle by General Smuts on 27th July, 1940. The units began to arrive in October. They were to be administered by South Africa through senior officers from the United Kingdom, which undertook to bear the cost and to supply the equipment.

South Africa had not been invited to take part in the negotiations leading to the Empire Scheme. Measures for the defence of Africa generally, however, were put in hand, including the expansion of the South African Air Force.

This involved increased training facilities, in which, by December, 1939, General Smuts was able to offer a share to European British subjects.

A British Mission headed by Air Chief Marshal Brooke-Popham went out to discuss working arrangements. As a first step it was decided to set up a good training nucleus in the Union, founded on a South African Flying Training School reinforced by R.A.F. staff. From this nucleus it was planned to provide, by training new instructors and diluting the staff of the original Service School, another four Service, four Elementary and four combined Observer and Gunnery Schools. When expansion was complete training output would be 2,600 pilots and 700 observers per year. They were to be sent to South Africa after passing through Initial Training Wings in the United Kingdom. The agreement was signed at Pretoria on 1st June by the Air Chief Marshal and the South African Chief of General Staff.

Training, however, was not all smooth going. The Union was embarking on a programme almost twice as large in proportion to the white population as that undertaken in Canada: it was a far less industrialized country with comparatively few skilled craftsmen. Some schools, at first intended for Kenya, had been added to the South African quota. Moreover, owing to Britain's difficulties during 1940 in keeping the supply of aircraft, equipment and spares up to schedule, reliance had often to be placed on older aircraft types, without the help, at first, of the Link trainer either. The financial question had also been left open in the original agreement and was still subject to discussion.

Consequently, in June, 1941, a revised Joint Air Training Scheme agreement was signed and became operative retrospectively from 1st August, 1940, up to the end of the war. South Africa was to bear the cost of stations, administration, fuel and oil, and bombs and ammunition; the United Kingdom of aircraft spares and replacements, and airborne and specialized equipment. The training schools (increased to seven Service, seven Elementary, eight Observer and Gunnery Schools, and one General Reconnaissance School) were to be available for both S.A.A.F. and R.A.F. cadets, first call upon them, including the output of all gunners, being reserved for the S.A.A.F.

A similar scheme outside the terms of the Empire Scheme, but parallel with it in purpose, was undertaken by Southern Rhodesia. After the outbreak of war the Rhodesian Government had offered to supply two new squadrons, making three with the original air unit, for ser-

vice on any front. While the air unit was gladly accepted and served gallantly in Kenya, an alternative agreement was made to operate flying training schools for the training of both R.A.F. and Rhodesian air crew. There were to be four Elementary, four Service Schools and one combined Observer and Gunnery School in the Rhodesian Air Training Group, supplied with aircraft and the bulk of their staffs from Britain. The first Elementary School was opened on 24th May, 1940, and the first output graduated from a Service School on 2nd November.

Difficulties here were not so much administrative, since Rhodesia had a separate Air Force with its own Minister and department, as operational. High altitude, heat and dust erosion adversely affected air crew, aircraft and airfields. Enthusiasm for the scheme, however, did much to overcome these trials. The shortage of spares was met by purchase from the wholesale and retail trade, by making new components at civilian factories and by salving parts from unserviceable aircraft. Results may occasionally have been unorthodox but the scheme in general proved very efficient, embracing, as it did, cadets from the United Kingdom, Australia, South Africa and Kenya as well as from Rhodesia. Australia, for example, sent 674 cadets straight from Initial Training Schools to complete training in Rhodesia, after which many of the pilots, observers and wireless operator/air gunners went out to Middle East R.A.F. pools.

Zero month for the complete operation of the Empire Scheme proper, planned first for April, 1942, was realized in September, 1941. Triumphant as it was, this achievement, six months ahead of schedule, had now become not so much the finishing line as the real starting point. The plan changed with changing demands and continued to grow in scope. At this time, for example, the target figure for Service Schools stood at fifty-eight, instead of the original forty-five. In December, 1941, there were 119 units of various types at work, 100 airfields in daily use, 1,860 buildings established among the training centres. Their work and their output went far to make possible the great raids of 1942 on Cologne, Hamburg and the Ruhr. But the plans of the R.A.F. went further still. A new lease of the Empire Scheme was first requisite for bringing them to fruition.

The United Nations Air Training Conference held at Ottawa in May, 1942, led to a renewal and reinforcement of the agreement concerning the Empire Air Training Scheme which came into effect on 1st July, 1942, and is due to expire on 31st March, 1945. An important development of Allied air planning and strategy was involved. Provision was also made for the pooling of arrangements for training and for employment after training with the United States, the extension of the Empire Scheme to include operational training units and the formation of a permanent Combined Committee on air training to sit in Washington.

The functions of the Combined Committee are advisory. Representatives of the United States, the United Kingdom and Canada, under an American chairman, meet to exchange information on air training generally, to initiate suggestions on training methods and to advise on measures to secure the most efficient use of North American facilities. In effect, the Committee makes possible much closer approach than before to standardization in air training and facilitates the interchange of experience at a level where efficiency in air operations begins.

The unmistakable determination of the Allies to plan on broad lines, dovetailing their schemes and using their air resources how and where they could best contribute to ultimate victory over the common enemy, is evident in the first provision of the conference. After America's entry into the war, pooling of aircraft by the United Kingdom and United States for employment by British and Americans against Japanese, Germans or Italians had come as a natural development of the Lend-Lease Act. It remained to bring this joint action to its logical conclusion. Training arrangements for the rapidly expanding United States Army and Naval Air Forces were, therefore, linked with those of the Empire Air Training Scheme, so that the pilots and aircrews of any country might be called upon to help in offensive or defensive action by an Allied nation. The results of this step were soon seen in the presence of American airmen in Australia and Iceland, of American aircraft in the Middle East flown by Englishmen, New Zealanders, Australians and South Africans, It was not long before United States Army Air Force units were operating against Germany direct from British airfields.

The other important step in training coordination and in getting air crews to their theatres of war with the least possible delay, was the inclusion of Operational Training Units under the organization in Canada. Time and shipping space formerly involved in their transfer to Operational Training Units in Britain were saved, and Canada was gratified to handle a fully operational output.

The extension of United States facilities for Commonwealth air training has a background

history that typifies the prevailing helpfulness which met the organizers of the Empire Scheme everywhere. Help began in 1940 when a number of American instructors, staff pilots and aircraft were permitted to take an unofficial part in the Canadian organization. Citizens of the United States also who had flying experience and wished to volunteer for the R.A.F., were given "refresher" courses at civilian schools in America, tested in Canada and then posted to the United Kingdom for operational training. To assist in air observer training Pan-American Airways offered yacancies to R.A.F. cadets at their navigation school.

Following the passage of the Lend-Lease Act in March, 1941, General Arnold was authorized to offer 260 elementary and 285 advanced trainers for use in six civilian schools to cadets from the United Kingdom. After initial training in this country air crews were to take all flying training at the same school—a process which suggested the title "All-through Scheme." Shortly afterwards a substantial number of United States Army Air Training Schools, both civil and military, were opened to British trainees. This, the "Arnold Scheme," was gratefully adopted and nearly 4,000 cadets a year underwent their training at these centres. Then, on the Navy side, Admiral Towers made possible the training of British pilots for flyingboats and carrier-borne aircraft, at the rate of about 1,200 a year. Canada agreed to handle the extra flow of cadets from the United Kingdom and to provide a transit camp for their temporary accommodation.

By the end of 1942 the great plan had reached its peak, a height that, in 1940, had seemed beyond attainment even to fanatical believers in the R.A.F.'s traditional motto. But what of the young men whose course was still set per ardua ad astra, the flying men, the living pattern beneath the plan? Their response and their record were, in final effect, the only true test of its worth. Perhaps it will suffice here to let a few of the individuals concerned speak for themselves:—

"One thing which impressed me was the friendliness between the officers and men. They seemed interested in us individually rather than as a class, and we could always go to them with our troubles or with our problems. There was also much friendly rivalry between the instructors about the progress of their classes. If a man was behind the rest or on the point of being failed, the instructors seemed to take it as almost a personal grief."

"I think it was at the Elementary School I became convinced there was a war on."

"Our working schedule was not light. The aircraft were pushed out and started up during the last hours of darkness, and first details were off as soon as it was possible to see across the airfield. The old triangular cross-country plotting exercises were seldom met, and usually we spent grimly interesting hours on such problems as 'The Admiral Scheer has been sighted off Borkum and you are to intercept and attack it'..."

"The ground crews watched our aeronautical activities with more than usual interest, for to help us keep alert there was a system of fines in force at the school. These ranged from ten cents for inadvertently stopping an engine on the ground to one dollar for completely writing off an aircraft. The list was quite comprehensive, taking in bumpy landings, taxi-ing with flaps down, landing and taking off out of wind or on the wrong runway, and many other faults in airmanship. The tribute was carefully collected and audited by a sergeant fitter, and during our stay at the school it served as a loan fund for hard-up erks and pupils, and after we passed out all the money went towards the cost of varied celebrations.

"Provided work was up to schedule, weekend leave was granted every fortnight. We usually spent it in Winnipeg, where we learnt what real Canadian hospitality is like. 'Are you boys spending the week-end in the city?' asked the lady who brought us coffee when we arrived at the Airman's Club for the first time, late one night. 'You are? That's great! Just hold on one minute and I'll get you the names of some people who would love to have you stay with them.' Five minutes later we were driven round to meet our hosts, who entertained us for the next two days."

Of the record in action of these men it is surely unnecessary to speak at all. When the whole story of war's achievement can be viewed in its true perspective, it will be in no way surprising if the discovery is made that the carrying out of the Scheme proved to be a deciding factor in the saving of free civilization. Whether or not such is the case, this is certain: without the men who went through the mill on Canadian airfields, British, and finally United Nations', superiority over the Luftwaffe would not have been achieved in twice the time. And from the first Empire-trained airman in action, describ-

ing an early raid over flak-infested Wilhelmshaven, as "a tough trip, but a swell introduction to the job," to the Canadian graduate who reported back to base after dropping his bomb load over a German factory, "One of those 4,000-lb. bombs can make a hole like the stairsteps to Hell," satisfaction at hitting the enemy where it hurts most has been the universal expression. To the cadets the training scheme has meant, first and foremost, opportunity to make such "stairsteps," and thousands and thousands like them.

So was Germany's concept of air mastery brought to fulfilment—by her foes. Early in 1944 the United Nations' air forces were rapidly approaching complete supremacy over those of the enemy in every theatre of war. The modifications made in the Empire Air Training Scheme had been designed to bring the greatest possible air weight against Germany during that year. By March more than 200,000 men had been trained—86,000 of them flying personnel, 114,000 ground crew. From the 154 schools

operating in Canada alone, 10,000 aircraft put in a daily average total of some 2,000,000 miles. These figures, far outstripping the original estimates, indicate the Allies progressive realization that in a war of machines trained manpower is the ultimate factor of success.

It became apparent that no further expansion of the training organization would be required: rather had the time come to prepare for its gradual limitation. A continual flow of trained men to supply the battlefronts could be ensured from the trainees already registered or under training. So, beginning in March, 1944, the intake of new trainees was reduced. As their quotas of pupils diminished the R.A.F. training schools were scheduled to close down. Staffs and instructors moved to the active theatres of war operations. Although the training organization could not, of course, be finally wound up in view of the possible requirements of the post-war world, it was envisaged that by March, 1945, Canada would have played out her part as the "aerodrome of democracy."

Training of R.A.F. Glider Pilots

HITHERTO, the piloting of operational gliders has been the sole responsibility of the Army who have their own Glider Pilots Regiment.

It is the responsibility of R.A.F. Flying Training Command to ensure that the air training of the soldiers is of the highest possible standard.

Under a new arrangement which, it should be stressed, does not foreshadow the disbandment of the Glider Pilot Regiment, R.A.F. pilots are to play their part in airborne operations as glider pilots.

Whereas it is the responsibility of Flying Training Command to ensure—as they do with the soldiers—that nothing is lacking in their training, it is the responsibility of the Army to be sure that their military and ground training is adequate.

The turning of powered-aircraft pilots into glider pilots has its own peculiar problems, but keenness and willingness on the part of all concerned—both Army and R.A.F.—has already achieved, in a few weeks, a conversion which might well have taken some months.

To man the newly formed glider squadrons, use has been made of the large pool of powered-aircraft pilots trained under the Commonwealth Air Training Plan. Most of them received their

wings some months ago, and have been awaiting posting to advanced flying and operational training units.

Fortunately, air casualties in operations over Europe have been fewer than had been anticipated, and when the decision to train R.A.F. glider pilots was made there was at hand a large number of men whose previous training made their conversion to glider pilots a comparatively easy task.

It was essential, however, that they should be trained sufficiently in ground fighting to be an asset and not a liability to airborne forces

they may land.

The first stage of training has been carried out by officers of the R.A.F. Regiment, and of the Glider Pilot Regiment, and the object has been to teach by demonstration and practice the organization of an air-landing platoon. As a result, any glider pilot should be able to organize his fellow pilots into a section, and fight as such in an emergency. Normally, after landing the glider, the glider pilots regroup with the object of returning for further supplies of men and material.

Lieutenant Patrick Dobbyn, of Tipperary, who has been a paratrooper and a glider pilot, is in charge of the Army Glider Pilot Demonstration Platoon. "The course might be described as a modified battle school in elementary tactics," he states. "We show them the rights and the wrongs of fieldcraft and camouflage, and put them through a pretty tough assault course. Our major demonstration is of a platoon in a defensive position being attacked by a night patrol. Parachute flares, machine gun and mortar fire are used to give some indication of what pilots may expect in night operations."

Ground training is continued at the Glider Training School, where pilots are given their first experience of gliding in Hotspurs, towed by master aircraft, used also by the R.A.F. in the very difficult role of an advanced fighter-trainer. Day and night landings are practised, and remote releases take place up to twenty miles away from the landing zone.

"All our pupils have between 250 and 300

hours' experience in flying powered aircraft, and there is no difficulty in converting them to gliding," said the Commanding Officer. "They very soon become used to flying at the end of a tow line, and to the much steeper angle of descent when preparing to land."

At the final stage of training, which is the Heavy Glider Conversion and Operational Training Unit, pupils pass on to the Horsa and Hadrian gliders and are crewed up as first and second pilots. Methods of loading, instrument flying by night and massed landings are practised.

From a height of a thousand feet over the perimeter, pilots learn to pin-point their machines to exact positions on the landing-fields so that in operations airborne troops may join up without delay.

The Air War in South-East Asia

THE campaigns which on land have witnessed the defeat of an ambitious Japanese attempt to invade India and the return of Allied armies over the Burmese frontier to the gates of Mandalay have not passed without momentous developments in the air war. Indeed, the progress of the war in the air over the Burma front has been intimately connected with the land campaign, one reacting upon the other as mutual cause and effect, a progress of which some explanation will be offered in the following pages. Conditions vary greatly from those usual in Europe. Aircraft in operational service are in type some six to twelve months behind those of the metropolitan air force, and in number very much less; they operate from widely scattered bases that with great labour have been improvized in a countryside that hardly varies from Arakan to Assam in its unfavourable climate and tenuous communications by land and water alike. For purely logistic reasons it might be doubted whether, even if unlimited reinforcements were available, the numbers of aircraft actually operating could be proportionally increased; of this also something will be said later.

Flying conditions also have something new to offer. Navigational aids, though increasing, are still comparatively few; maps are often skimpy and unreliable, and landing-grounds are by no means so conveniently numerous as at home. For the greater part of the year there is indeed a sky which over the plains is rarely clouded; but most operational flying takes Allied aircraft eastwards from their bases in Bengal and Assam over the wild jungle-clad hills that rise to eight and ten thousand feet and separate India from Burma. Cloud may be met here at all times of the year, but during the four monsoon months in particular these mountains are a home of violent storms and squalls that constitute a considerable flying hazard to crews, and not the least achievement of the present campaign is the acquisition of air bases on the Burmese plains beyond them.

What follows should in no way be judged as a summary of events; it is merely an attempt to select from the pattern of developments the most significant strands in a period marked by a notable degree of co-operation between the R.A.F. and U.S.A.A.F., whose units have mingled under mutual operational control to meet the changing needs of the tactical situation. The co-ordinating authority for Allied air operations on the Burma front rests with the Eastern Air Command under Air Command, South-East Asia; the headquarters of each is an integrated unit comprising both British and American personnel. The Air Commander of the former is Major-General George E. Stratemeyer, who is also Commanding-General of the U.S.A.A.F. in the India-Burma Theatre; the Allied Air Commander-in-Chief until November, 1944, was Air Marshal Sir R. E. C. Pierse, K.C.B., D.S.O., A.F.C., and is now Air Marshal Sir Keith Park, K.C.B., K.B.E., M.C., D.F.C.

THE MAINTENANCE OF AIR SUPERIORITY

During the campaign of 1942-43, and for a few weeks at the close of the monsoon in 1943, Allied air superiority over the Burma Front was contested on not very unequal terms by the Japanese, whose Oscars proved tough opponents for the Hurricane to tackle and whose Dinahs outflew the latter to make reconnaissance flights over our forward areas with impunity. The final establishment of Allied air supremacy was marked by two milestones. The first in point of time was the advent of Spitfires at the beginning of November, 1943. Within a fortnight they had shot down three successive Dinahs, and during the next four months not one Japanese reconnaissance aircraft succeeded in covering our forward bases. A series of air battles subsequently developed in which the Japanese scored one success by a daring daylight raid on Calcutta on 5th December, as a result of which the timorous coolie population could not fully be induced to resume work at the docks for some weeks; but before the end of January, 1944, the Spitfires had accounted for some forty-four aircraft with another thirteen probably destroyed and fortynine damaged, for the loss of seven. These figures require no comment.

The second milestone was reached in the opening months of 1944 when long-range fighters of the 10th U.S.A.A.F. and of the 1st Air Commando Group-Lightnings (P38) and Mustangs (P51)—began to operate in force. The Spitfires had taught the enemy severely to restrict the offensive use of his aircraft and he had practically ceased as a result to make use by day of his bombers over our lines while his fighters seldom attempted to make deep penetrations. The long-range fighters were now able to seek him out on his own airfields and, owing to the embryonic nature of the Japanese warning system, they were often in a position to attack his aircraft before they could become airborne. During a series of sweeps over the main enemy air bases in Northern Burma in March and April they destroyed or probably destroyed well over a hundred aircraft caught on the ground, in addition to another seventysix in aerial combat. It is very possible that the enemy squadrons thus handled had been brought up specially to support the ground offensive then being aimed at Imphal and Dimapur. It was in any case a serious blow to the enemy, who disposed of considerably less than three hundred aircraft for operations in Burma at this time. A major result was that he was forced to withdraw his fighters to the Rangoon area, so the Japanese air support operations during the siege of Imphal were conducted from bases some five or six hundred miles distant from the front; his forward airfields—which had been constructed in abundance—were used under cover of elaborate camouflage and dispersal arrangements merely as advanced refuelling stations and emergency landing-grounds.

Frequent and regular sweeps continued throughout the year over the enemy forward airfields with generally a marked absence of enemy aircraft to report. In October and November a further stage in the enforcement of Allied air supremacy was reached when a series of large-scale fighter attacks, in each of which up to ninety long-range fighters took part, was directed against the main base airfields of the enemy in the Rangoon area; in the course of these operations some three dozen enemy aircraft were destroyed or probably destroyed in the air or on the ground, for the loss of four. While the Japanese still attempt sporadic raids generally by small elements operating under cover of cloud or darkness against the most advanced Allied outposts, nevertheless the Allied forces in the field fight with the assurance that the enemy interference is unlikely to be more than momentary and slight. From the air point of view, the Allied air superiority has made it possible to deploy and operate to maximum advantage the other weapons in the Allied air armoury-bomber, transport and direct-support aircraft. To the achievements of these some attention will now be given.

DIRECT ARMY SUPPORT

Although such direct support as was possible with the available aircraft had from the beginning been afforded to the ground troops, it was not until the campaigning season of 1943-44 that the Allied air forces were in a position to afford that measure of aid required by contemporary developments in the art of war and by the nature of the terrain across which the contending armies faced each other. Operations in the field were from thenceforth invariably preceded by the attacks of fighterbombers. The squadrons engaged in this work developed great accuracy of aim, their targets being known in the case of the most skilled to have been set as close as thirty yards from Allied outposts, and they secured evidence as to the efficacy of their attacks from both sides —from the Japanese, by the readiness with which they evacuated positions that had been bombed and by the dread with which they confessed in their diaries to be filled by these assaults, and from our own forces by the frequent signals of appreciation that they subsequently received from forward units. During the operations to clear the enemy from Manipur, when their bases were close behind the front line, their work was specially effective. On one solemn occasion the commander of a Gurkha battalion formally presented to a supporting fighter-bomber squadron two trophies—as a token of gratitude.

AIR TRANSPORT OPERATIONS

Air transport operations developed enormously during 1944; they provided the Allied answer to the usual Japanese tactics of infiltration and envelopment and enabled the Allies to exploit their economic and technical superiority to overcome the mobility and endurance of the Japanese soldier. The failure of the Japanese Arakan offensive in February provided the first demonstration of the tactical value of transport aircraft. A whole division was completely cut off by the Japanese, who aimed at nothing less than the capture of Chittagong, our major port in the Arakan. The decision was taken to effect the supply and ultimate relief of 7th Indian Division by air. Despite Japanese efforts to interrupt the process of delivery, which was decisively defeated by our Spitfires, the Division was enabled to resist and then to counter-attack the enemy, who thereby suffered his first major defeat on land in this theatre.

History repeated itself on a much larger scale during the following months, when a complete army corps together with substantial R.A.F. elements was encircled on the Imphal plain. From March to June this beleagured garrison was maintained by air supply until it too was able to turn the tables upon an enemy who had rashly committed his forces to an operation for which his supply lines, seriously worsened by the monsoon rains and harried continuously and effectively along their whole length by the Allied air forces, were inadequate to sustain.

As a basis for far-flung offensive action, air supply had demonstrated its value during the operations of the first Wingate expedition behind the enemy lines early in 1943, and in 1944 the land campaign, as planned and executed, provided for the maintenance by air not merely of the second and larger Wingate expedition but also to an ever-increasing extent of the Chinese-American forces advancing into

Burma from Assam, and a West African division moving down the Kaladan Valley in Arakan.

Transport aircraft operating throughout the monsoon braved the worst possible weather over the mountains to fulfil missions whose urgency allowed no delay. Apart from the possibility of meeting Japanese fighters on their way—such encounters were, however, rare they also had to face fire from ground troops when, as was frequently the case in the first six months of the year, they were required to deliver their freight in areas distant only a few hundred yards from enemy positions. In 1944 a grand total of nearly a quarter of a million short tons of supplies was conveyed to fighting units by crews who in some months were worked to exhaustion; in addition, over a hundred and sixty thousand men were moved from place to place and more than sixty thousand casualties were evacuated to hospitals outside the zone of battle. These figures underlie the operations which wrested victory from the Japanese offensives in Arakan and Manipur in the earlier part of the year and which made possible the Allied advance upon Myitkyina and the later thrusts which carried Allied forward troops to and beyond Bhamo, Wuntho and the lower Chindwin. To illustrate the endurance and mobility lent to army formations by air transport it should suffice to mention the history of the 5th and 7th Indian divisions; both were enveloped during February in the Japanese Arakan offensive, one being completely and the other largely dependent upon air supply for some weeks during which, if left to fend for themselves, they could hardly have survived. In March the 5th Indian Division was flown lock, stock and barrel to the Imphal plain in about a quarter of the time it would have taken to get there by the overland route; there for four months, in common with the rest of the encircled garrison, it was maintained exclusively by air supply. In April the 7th Indian Division was similarly transported to Assam, where it was partly maintained by air. Both were well-tried fighting units with famous traditions, and their unexpected appearance in the central sector of the front was an essential factor in the defeat of the Japanese Manipur offensive.

THE LONG-RANGE OFFENSIVE

Long-range attacks upon the enemy supply lines and kindred targets in Burma and Siam as elsewhere are cumulative in effect and their results can only be assessed after some passage of time. It has recently come to light that

the Japanese supply deficiencies materially contributed to weaken resistance to the Allied advance into North Burma, and, to take another instance, that some Japanese reinforcements entering Burma from Siam have been reduced to doing so on foot or by cycle. Only occasionally is it possible to learn that, for example, some six hundred Japanese casualties were caused by a single heavy bomber raid upon Bangkok, and only now and then do Allied aircraft have the opportunity of so spectacular an exploit as the two-day attack on 9th and 10th September by Beaufighters upon supply convoys moving up the Tenasserim coast. As a result of this attack some three. thousand tons of shipping were left beached and blazing and as much and more damaged.

Ground-attack fighters operated over enemy communications in Burma from January, 1943, onwards and by the beginning of 1944 had developed to a fine art the ability to detect their targets behind the elaborate camouflage in which the enemy was learning to shroud them. During the year, despite the increasing reluctance of the enemy to move in the open, they made by day and night nearly 4,500 successful attacks upon rivercraft, including over 140 steamers and powered launches, approximately 350 upon locomotives and not far short of a thousand upon motor transport. Medium and light bombers also contributed to the interdiction of the Japanese lines of supply, their main targets being bridges; in all, some five hundred were destroyed or seriously damaged during 1944. It is an illuminating commentary upon the enemy reaction to these attacks that during the year he built no less than thirtynine emergency by-pass bridges of wood for use when the neighbouring main structure should have been out of commission by Allied air attack.

During the latter part of 1944 the Strategic Air Force increased rapidly in size. Its heavy bombers, operating by both night and day, flew some 3,500 sorties during the year. These included twenty-two attacks upon targets in the metropolitan areas of Rangoon and Bangkok and others upon certain supply centres elsewhere, notably at Taungup and Prome in southern Burma. But a considerable proportion of the effort was directed against enemy lines of communication, particularly in the railway linking Burma with Siam, on whose construction many thousands of Allied prisoners of war laboured in 1942 and 1943; the twin termini at Moulmein, where the line is broken by the mouth of the River Salween, were frequently included among the targets. The main north

line of the Siamese State Railways, running from Bangkok to Chiengmai and serving the Japanese as a subsidiary line of supply, has also been attacked on numerous occasions as part of the same strategic plan.

Mining operations were carried out against the ports used by the Japanese to supplement their overland communications; these were mainly on the Tenasserim and Siamese coasts. One operation involved a round flight of over 3,000 miles—a record trip for Liberators in any theatre of war. Very long distances over mountainous and poorly mapped country were also covered in attacks on targets in the neighbourhood of Hanoi and elsewhere in French Indo-China.

The long-range offensive would not have been possible but for the work of the Photographic Reconnaissance Force, another mixed formation composed of R.A.F. and U.S.A.A.F. squadrons operating under Eastern Air Command. In addition to providing routine cover of Burmese airfields and communications their aircraft flew as far afield as northern Sumatra and the Andaman and Nicobar islands and penetrated deeply into Siam and French Indo-China. The photographs they have brought back have been collated into an invaluable source of information upon the hitherto little-known areas that will form the battlegrounds of successive campaigns.

THE WAR SETTING

The Allied achievement in the air over the Burma front, of which some indication has now been given, should be judged not by the standards applicable to the European theatre of war but in relation to the tropical wilderness which has been its setting. The Burma front in length is comparable to the Russian front, though owing to the impassable nature of the country there are wide stretches of territory in which contact between opposing forces has been slight or non-existent. The Allied bases in Bengal and Assam to the west have been sited and painfully developed in a countryside served by a single one-track railway which may have sufficed for the needs of the local peasantry but which in Europe would have been considered a poor source of supply for a battlefront one-sixtieth the length of the Burma Front; waterways are more a hindrance than a help to communications and such third-class roads as existed were normally quagmires for the four months of the monsoon, while nowhere did they reach completely to the battle-line.

It is in such country, where until 1942 the



R.A.F. SUNDERLANDS undergoing engine changes and overhauls at a flying-boat base in Ceylon

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ON THE ARAKAN FRONT

A.A. gun crew manned by men of the R.A.F. Regiment give a hand to a Hurricane pilot as he brings his aircraft back to base from a patrol on the Burma Front



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ON THE BURMA FRONT
A line of R.A.F. Thunderbolts heading for the take-off

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only aircraft ever visible were the air liners calling at Calcutta on their way from Europe to Australia and the Far East, that airfields have been built, installations erected and supplies provided for the squadrons, British and American, which are at present helping so

powerfully in the reconquest of Burma. Their aid has been such that, it can fairly be claimed, in no other theatre of war are the operations of ground and air forces so inter-related, nor the achievements of each Service accorded better recognition by the other.

Maintenance of Peace

N the House of Lords on 13th February Viscount Trenchard rose to ask Majesty's Government whether any progress had been made in considering the best means of strengthening the armed forces in Europe with a view to preventing war before it broke out, and in particular whether they had considered the part air could play. The noble Viscount said: "... The underlying basis of my suggestion, which is a very modest and simple one, is the friendship that has grown up in this war between our Royal Air Force and the Air Forces of our Allies. There is no doubt that this friendship is sincere. These young men are only boys to-day but they will be the leaders of their respective nations in the future. They have fought together, flown together; they have had those long flights over Germany, over the Atlantic and over the North Sea together-Norwegians, Dutch, French, Belgians, Poles and Czechs. It is more than ordinary friendship. Without allowing sentiment to take too great a place in my remarks I feel that your Lordships must realize that this friendship is a friendship which will endure and which should be encouraged. It was the same in the last war. The friendship between ourselves and our American allies—as it is to-day—was closer in the air services than between any other service, any other profession or any other walk of life.

"Only last night an American broadcasting over our system after the nine o'clock news used this expression:—

"'If the British Tommy and the G.I. Joe are second cousins once removed, the British and American pilots are half-brothers. In fact after a time it is very easy to forget there is any distinction at all.'

"There is something in the air which brings airmen together when they fly together. In the vast open space of the skies there are no national boundaries. Nationality loses a certain amount of its influence. They become friends

in the air in all its intricacies, dangers and delights. Therefore this natural association is worth cultivating, encouraging, maintaining and developing. Do not let us throw it away as we did after the last war. My suggestion is that we should make arrangements now—not treaties, but arrangements with our friends and Allies. I feel we should make sectional arrangements which come within and under, if necessary, the auspices or control of the proposals or agreements that come into being as outlined at Dumbarton Oaks. I ventured to say in the last debate on the same subject:—

"'Neutrality is dead, and there will be no such thing as neutrality in the future in Euro-

pean wars.'

"These local arrangements should be made broadly on the following lines: In order to ensure that the Air Force is available, then the organization must be such that the force can be used at once to prevent war. I would like to repeat that I want an organization to prevent war instead of waiting until war breaks out and then organizing. I want to see friendly arrangements made by this country with the Western Powers of Europe, such as Norway, Holland, Belgium and France, to have their Air Forces organized on similar lines as ours. The squadrons should be organized on the same lines in these countries and equipped with the same sort of machines—not necessarily the same machines, but the same types such as fighters, bombers, fighter-bombers, equipped with the same type of weapons such as bombs, rockets, torpedoes, etc. The aerodromes should also be organized on similar lines in these countries, with the same landing orders, the same airfield rules and the same types of wireless communication and codes. It is done now. Why cannot it be continued? Surely this is the time to consider arranging that the present similarity should be continued in peace-time so as to be ready for war. In this war we have had squadrons composed of men from France, Belgium,

Holland, Czechoslovakia and Poland, sometimes commanded by an Englishman, sometimes by an officer from the Dominions, and sometimes a British squadron has been commanded by a foreign officer. I do not ask that we should go as far as that in peace-time—I do not think it would be practicable—but we should have our Air Forces similarly organized. I am not asking anything that would be controversial such as interference with national sovereignty. My proposals do not interfere with

that in any way. "Now I come to my most important point. I would like to see it arranged between Britain and the countries of the Western Powers that I have mentioned and will repeat—France, Belgium, Holland and Norway-that squadrons from these different countries can fly to certain selected aerodromes—I repeat selected—in any of these countries for practice, for training purposes or even for friendly visits or functions of sport and stop there for a day or two or three days. In these days of flying these countries do not want to be circumscribed to their own boundaries. It is no practice to fly up and down a little country when a couple of thousand miles is no distance in flying. The squadrons of these countries ought to be able to do this without having to obtain permission each time from Governments, Ambassadors of Foreign Offices. It should be a matter of course, by friendly and amicable arrangement between the commanding officers of the Air Services in the different countries, just as our commanding officers now in our own country move squadrons from one Command to another. I suggest that we should choose, say, twenty aerodromes in this country and perhaps the smaller nations should have five each or more. At these aerodromes should be at least one—if not more squadron always stationed, and accommodation for one or two visiting squadrons. There should be hangars, huts and, generally speaking, everything that is needed to give the visitors a proper welcome. As to the smaller nations, Norway might perhaps have five of these aerodromes, Belgium five, Holland five, and France a certain number. I feel that just as civilians can go to other countries with only their passports, so our squadrons and the squadrons from friendly Powers should be able to visit each other's countries with simply their uniforms and their commanding officer's signatures as passports. Let the officers and men of these visiting squadrons go freely about amongst our men. Surely visits conducted on these lines would make for the formation and maintenance of most valuable friendships.

"In making these suggestions, I have not left out of account our great American Ally. Their organization and ours are practically the same to-day, and I feel that similar friendly arrangements should be made on the same friendly lines, that I have suggested with regard to other nations, between the Air Services of our two countries. Surely this sort of arrangement could be made between our Royal Air Force stations in the Far East—in Singapore. Malaya, Burma and Hong Kong-with our American allies in the Pacific and with the great Dominion of Australia. They want to be able to fly at will to pay us visits, and we want to be able at any time to drop in and see them. In spite of the vastness of their own country. the Americans will want to fly the Atlantic and so shall we, and it should be almost taken for granted that we can land on certain selected aerodromes in each other's countries. I am not wanting to make a combination of West against East—far from it. Russia can, and most probably will, make arrangements locally with the Eastern Powers. Could we not connect up with the Russians in the same way in the Middle East and even in parts of Asia. In the same way, surely, we could have a friendly arrangement between our Air Force in the Far East and the Dutch in the Netherlands. Is this all beyond the bounds of possibility? I do not think so, and I feel that it would add to our friendship.

"I consider that these proposals of mine have two advantages. One is that if really friendly mutual arrangements are made, whereby visits between squadrons and other units of one nation to another are promoted, it will maintain and increase the friendship between our nations, which is particularly what we want. The social meetings between the air crews of the different nations would lead to a permanent link of understanding amongst themselves, and also amongst their relatives and their friends. Our air crews would meet their friends and relatives and their air crews would meet ours. Secondly, the organization of the Air Forces of the Western powers on similar lines to ours would ensure that a force would be ready at any time, should a crisis arise, to come immediately into action to prevent war.

"I am one of those who would rather plant a small seed and watch it grow into a great tree than carry out the great task that is performed frequently by other people—and often fails—of planting a grown tree with all its branches and support it with props. It was the planting of small seeds such as those to which I refer that made England and the British

Empire in the past, and I believe that we should make that our policy in the future. I believe that at the same time these great and important conferences are going on the more humble work of planting these tiny seeds may also be performed. I hope that it will be performed and that mighty trees will grow from those seeds. Do not let us lose the chance of keeping that friendship which I have mentioned—the friendship that is inherent in airmen who have fought together in the air, in the intimacy of the skies in cloud, mist, rain, snow, fog and sunshine. That friendship will last when all others die. Is it too much to suggest that at the next great conference between the three Great Powers our Prime Minister. President Roosevelt and Marshal Stalin should issue a joint statement to the effect that the informal and friendly arrangements already in existence between the different Air Forces of the United States, Russia and the friendly Western Powers and ours, shall continue after the war in order to ensure that an adequate force is always ready to prevent war in the future? I know that a simple statement on those lines would be welcomed by all in the Air Services, and would do much towards keeping the peace, which, as I have said, is the key to all future problems. . . . "

Lord Brabazon of Tara said that "... we have to realize that after the war there are going to be three Air Forces in the world, and three only—the Russian, the American and our own. . . . Now I sincerely hope that we shall be able to visit not only America but also Russia, and that she may be able to come and see us, as Lord Trenchard says. But there is another curious thing which is happening before our eyes but which we have not noticed, and that is the building up to-day of a European International Air Force—our own Royal Air Force. In it you will find all the small nations of Europe, actually serving, with their names on their shoulders. It is curious that they had first thought they wanted separate squadrons within that force, but they did not want it finally; they just wanted to be individuals in that Air Force. If, in the stress of war, we can run an Air Force composed not only of our own people but of citizens of these other countries of Europe, it would be, to my mind, a most desirable thing that, instead of having small Air Forces in small countries, we should perpetuate . that amalgamation and foreigners of friendly Powers in Europe to serve with ourselves, so that we may be able to build up together at least the first part of a real International Air Force."

Replying to the debate the Lord Chancellor

(Viscount Simon) said: "... The noble Viscount's question touches very directly one aspect, the air aspect, of the arrangements to assist in the development of post-war organization for securing peace. That is, of course, one of the features of the striking and comprehensive declaration issued this morning in the Press and coming from the Crimea Conference. Let me quote one paragraph of that communication for it will show how closely the question now raised is connected with those matters that have been under intense discussion and analysis between the three great leaders of the three great Allies. I extract this passage from the declaration:

"'We are resolved upon the earliest possible establishment with our Allies of a general international organization to maintain peace and security. We believe that this is essential both to prevent aggression and to remove the political, economic, and social causes of war through the close and continuing collaboration of all peace-loving people. The foundations were laid at Dumbarton Oaks.'

"My noble friend in the course of his speech said he liked to plant a seed in the hope that it would develop into a tree. Well, somebody planted an acorn and it developed into a Dumbarton Oaks. But there is, of course, a great deal to be done with the propositions of a general character that were advanced at Dumbarton Oaks before the achievement of what I have just read from the declaration of the Crimea Conference can be practically secured. My noble and gallant friend asks whether we could not make arrangements now (for now is the accepted time) with our neighbours and Allies for the better development of their post-war Air Forces—arrangements which would fall within the general scheme of Dumbarton Oaks and would help to secure such an organization by mutual agreement as would promote and make ready a combined Air Force to be used at once to prevent war if occasion arises. He has illustrated this idea and has been reinforced with the authority of my noble friend Viscount Templewood, by asking whether friendly arrangements could not be made, for example, with Norway, Holland, Belgium and France, to have their post-war Air Forces organized on similar lines to our own. Well, having taken counsel on the subject, I am able to assure the noble Viscount, Lord Trenchard, at once that His Majesty's Government are entirely at one with him in approving the spirit of that proposal, that they realize its importance and that his technical suggestions are most welcome and will be further studied. To a large extent, as I will show in a moment, this general conception is being pursued.

"Let me put in here the acknowledgment which I must make to the suggestion which Lord Templewood put forward. He asks whether the Chiefs of Staff Committee, or some other suitable body, might not receive directions from the Cabinet to take these suggestions into consideration and to work out how they might be carried into effect. I naturally have no express authority to make a reply to what was said a short while ago, but I am perfectly confident that the proposals made here and pressed upon us this afternoon are proposals which will be regarded by the War Cabinet as well worthy of their own attention, and I feel confident in my own mind that the suggestion that they should be thus pursued is one that is likely to be taken up.

"Something has been said—and I suppose most of your Lordships are already acquainted with the facts—of the assistance which we have given ever since 1940, and are continuing to give, to the Air Forces of our neighbouring European Allies. That assistance will certainly count as an important contribution towards the re-establishment of their national Air Forces in the post-war period. See how far it extends. This assistance which we are giving includes the supplies of British equipment, of all possible help in training, and the supply of technical and other information necessary for successful co-operative work. His Majesty's Government hope that the very close links between the Royal Air Force and these Allied Air Forces will be maintained and developed during the post-war period and that we shall be privileged to continue in the future to help our Allies in these ways. By this means the really remarkable association which has developed between the Royal Air Forces and the Allied Air Forces will, we hope, be perpetuated. It may take many forms, and various forms, I am informed, are under close consideration at this time.

"... I can give a definite assurance that this matter is already in train, both in our own forecasts for training and plans for manufacture in the future, and that it is a subject of talks with some of our Allies already.

"His Majesty's Government consider that this co-operation is a most important contribution to the world organization sketched out at Dumbarton Oaks. That was a point made in the debate more particularly by my noble friend the Earl of Perth. It is in course of further development as a result of more recent conferences. It is worth while perhaps putting on

record in a few sentences what has actually happened. Allied air units are at present serving with the Royal Air Force, fully integrated with the Royal Air Force. They are organized, they are trained, and they are operated on an almost identical basis. Poles—and they make most gallant airmen-Belgians, Dutch, Norwegians, French, Czechs, Greeks and Yugoslavs all take advantage of this friendly contact in various ways. I think nothing corresponding to this has ever happened in the history of warfare. These people are friends. They are flying British machines or, sometimes, American machines. Their national squadrons and training units use our British aerodromes in the closest and friendliest co-operation with the Royal Air Force. In some cases—for example, in the case of the Poles who have supplied a surprising number of pilots—they have their own aerodromes in this country with their own station commanders acting in co-operation, it may be, with a British station commander.

"Therefore my noble friend Viscount Trenchard was no whit exaggerating when he emphasized the nature of the opportunity which is now before us. The question is how far that close integration in its present form—of course they will get back to their own aerodromes in their own countries—can be made a common object of our policy and contribute to the carrying out of projects for securing peace after the war. His Majesty's Government are in the fullest agreement with my noble friend Viscount Trenchard as to the desirability of continuing the close co-operation with all our Allies which has grown up during the war as a means of preserving peace and encouraging mutual understanding. It is right to say that the principles underlying that conception are generally accepted by the Air Staff, particularly this technical but essential matter of securing common practice and mutual understanding in such matters as airfield control and communications.

"I wish in the description I am trying to give to set the matter within its proper limits. It is not, of course, essential, and indeed may not be practicable, to aim at identical organization and identical types of aircraft. As my noble friend Viscount Trenchard pointed out, precise similarity does not exist to-day in many cases. We all know that the organization and types of aircraft of the United States Air Force and the Royal Air Force are not identical. Yet it has proved possible for these two Air Forces to work in the closest co-operation, and for their formations to be detached from the parent Air Force and to work in association with others under the control of commanders of either

nationality, as was so very interestingly explained to us in the course of the debate. The matter really stands thus, and I hope this assertion and this assurance will give satisfaction in the quarters which have raised this most

important matter for inquiry.

"The details for future inter-Allied co-operation between Allied forces under the ægis of a world organization are the subjects of immediate study. They spring, as I have said, out of the Dumbarton Oaks Conference. There, I would remind your Lordships, certain proposals were discussed for the provision of national quotas—my noble friend the Earl of Perth referred to them—to constitute some form of international instrument at the disposal of the Security Council. Perhaps some of your Lordships will like the reference to the document. I will not read it all. Chapter VIII (B) of the Dumbarton Oaks plan, particularly the paragraphs (5) to (9), and again Chapter VIII (C) contain the relevant passages. For example, in Chapter VIII (B) (5), you will find these words:

"In order that all members of the Organization should contribute to the maintenance of international peace and security, they should undertake to make available to the Security Council, on its call and in accordance with a special agreement or agreements concluded among themselves, armed forces, facilities and assistance necessary for the purpose of maintaining international peace and security."

"Further details follow, and in paragraph (6)

it is stated that

"'there should be held immediately available by the members of the Organization national Air Force contingents for combined international enforcement action.'

"See, my Lords, what a great step will have been taken towards securing the working of such a plan, which we have been able to follow with our neighbours and Allies, the plan of close association after the war which will make our respective Air Forces, already active comrades, acquainted with one another's ways following common training and technical control. Instead of having, as it were, to call out in an emergency forces which have not had previous experience together, you would be calling upon a body, a combination it may be of several of the Allies, able at once to take the air in unison. Your Lordships will notice that these proposals contemplate that the member States of the Organization shall make the necessary agreements between themselves to make available to the Security Council of the World Organization the necessary armed force with facilities for maintaining international peace. The Military Staff Committee, as it is called by the Dumbarton Oaks Conference, the "General Staff" of the World Organization, will advise the Security Council from the technical point of view upon the arrangements necessary, and will be responsible for the strategic direction of national armed forces placed at the disposal of the Security Council.

"Now the point which I have endeavoured to bring out, and which I wish to stress, is one which will, I believe, appeal to anyone who has been good enough to listen to me. The close association that has grown up in battle between our own and the Allied Air Forces will form a most valuable foundation for arrangements of this kind in the future. Again, the association between those Allied Air Forces may prove very valuable when the time comes to consider the formation of regional arrangements which are contemplated and, to some extent, provided for in Chapter VIII (C) of the Dumbarton Oaks

proposals.

"My noble and gallant friend has referred specifically to the necessity for a unified signals and flying control procedure amongst these Air Forces. All our Allies are, of necessity, well acquainted with our flying control system owing to the familiarity which they have gained during their period of operations under our control. We have also trained numbers of Allied officers in airfield control and flying control—generally, I believe, at the Central School of Flying Control—and I might add that negotiations are now in progress for a number of French air officers. to come from France to be trained in flying control in this country. This applies to some other Allied airmen also. We have already had a visit from a French Signals Mission which has had every facility for inspecting our Signals organization. In an endeavour to ensure that the Air Forces of our neighbouring Allies have the same broad basis of organization as the Royal Air Force, we have allotted in this country Royal Air Force stations to various Allies to enable them to train, under their own commanders, the necessary personnel to rebuild their Air Forces. These stations, of course, are run on Royal Air Force lines, although I think I am right when I say that Royal Air Force assistance is only given so far as it is asked for and required.

"Your Lordships will see, therefore, that we have actually at work in this country a system which, as it seems to me, Lord Trenchard is very well entitled to regard as the seed of some permanent and equally close arrangement between us when the war is over. All the matters of which I have spoken which are outside my

own personal knowledge, are matters on which information has been supplied to me by the proper authorities and that information may therefore I think be taken as authoritative and, I hope, exact. I trust the answer which I have given will go far to satisfy my noble and gallant friend and others that his own thoughts on this subject follow the same lines as those which are being adopted by His Majesty's Govern-

ment.... But, even though arrangements do not turn out to be quite so simple as might appear from Lord Trenchard's speech, our spirit in the matter is perfectly willing. It is essentially a matter of negotiation and agreement, and, as I say, our spirit is perfectly willing. Our resolve to pursue what is essential in this project, and to achieve it in every possible way, is firm...."

The Crimea Conference

STATEMENT BY THE BIG THREE

THE following statement is made by the Prime Minister of Great Britain, the President of the United States, and the Chairman of the Council of People's Commissars of the Union of Soviet Socialist Republics on the result of the Crimea Conference:—

1.—DEFEAT OF GERMANY

We have considered and determined the military plans of the three allied Powers for the final defeat of the common enemy. The Military Staffs of the three allied Powers have met in daily meetings throughout the Conference. These meetings have been most satisfactory from every point of view and have resulted in closer co-ordination of the military effort of the three allies than ever before.

The fullest information has been interchanged. The timing, scope and co-ordination of new and even more powerful blows to be launched by our armies and air forces into the heart of Germany from east, west, north and south have been fully agreed and planned in detail

Our combined military plans will be made known only as we execute them, but we believe that the very close working partnership among the three Staffs attained at this Conference will result in shortening the war. Meetings of the three Staffs will be continued in the future whenever the need arises.

Nazi Germany is doomed. The German people will only make the cost of their defeat heavier to themselves by attempting to continue a hopeless resistance.

2.—Occupation and Control

We have agreed on common policies and plans for enforcing the unconditional surrender terms which we shall impose together on Nazi Germany after German armed resistance has been finally crushed. These terms will not be made known until the final defeat of Germany is accomplished.

Under the agreed plans the forces of the three Powers will each occupy a separate zone of Germany. Co-ordinated administration and control has been provided for under the plan through a Central Control Commission consisting of the Supreme Commanders of the three Powers with headquarters in Berlin.

It has been agreed that France should be invited by the three Powers, if she should so desire, to take a zone of occupation, and to participate as fourth member of the Control Commission. The limits of the French zone will be agreed by the four Governments concerned through their representatives on the European Advisory Commission.

It is our inflexible purpose to destroy German militarism and Nazism and to ensure that Germany will never again be able to disturb the peace of the world. We are determined to disarm and disband all German armed forces; break up for all time the German General Staff that has repeatedly contrived the resurgence of German militarism; remove or destroy all German military equipment; eliminate or control all German industry that could be used for military production; bring all war criminals to justice and swift punishment and exact reparation in kind for the destruction wrought by Germans; wipe out the Nazi party, Nazi laws, organizations and institutions; remove all Nazi and militarist influences from public offices and from the cultural and economic life of the German people; and take in harmony such other measures in Germany as may be necessary to the future peace and safety of the world.

It is not our purpose to destroy the people

of Germany, but only when Nazism and militarism have been extirpated will there be hope for a decent life for Germans and a place for them in the comity of nations.

3.—Reparation by Germany

We have considered the question of the damage caused by Germany to Allied Nations in this war, and recognize it as just that Germany be obliged to make compensation for the damage in kind to the greatest extent possible. A Commission for the Compensation of Damage will be established. The Commission will be instructed to consider the question of extent and methods for compensating damage caused by Germany to the Allied countries. The Commission will work in Moscow.

4.—United Nations' Conference

We are resolved upon the earliest possible establishment with our allies of a general international organization to maintain peace and security. We believe that this is essential both to prevent aggression and to remove the political, economic, and social causes of war through the close and continuing collaboration of all reace-loving people. The foundations were laid at Dumbarton Oaks.

On the important question of voting procedure, however, agreement was not there reached. The present conference has been able

to resolve the difficulty.

We have agreed that a Conference of United Nations should be called to meet at San Francisco, in the United States, on 25th April, 1945, to prepare the Charter of such an organization along the lines proposed in the informal conversation at Dumbarton Oaks. The Government of China and Provisional Government of France will be immediately consulted and invited to sponsor invitations to the Conference jointly with the Governments of the United States, Great Britain, and the U.S.S.R. As soon as the consultation with China and France has been completed the text of the proposals on voting procedure will be made public.

5.—Declaration on Liberated Europe

We have drawn up and subscribed to a Declaration on Liberated Europe. This Declaration provides for concerting the policies of the three Powers and for joint action by them in meeting the political and economic problems of Liberated Europe in accordance with democratic principles. The text of the Declaration is as follows:—

The Premier of the U.S.S.R., the Prime Minister of the United Kingdom, and the President

of the United States of America have consulted with each other in the common interests of the peoples of their countries and those of Liberated Europe. They jointly declare their mutual agreement to concert during the temporary period of instability in Liberated Europe the policies of their three Governments in assisting the peoples of Europe liberated from the domination of Nazi Germany, and the people of the former Axis satellite States to solve by democratic means their pressing political and economic problems.

The establishment of order in Europe and the rebuilding of national economic life must be achieved by processes which will enable the liberated peoples to destroy the last vestiges of Nazism and Fascism and to create democratic

institutions of their own choice.

This is a principle of the Atlantic Charter—the right of all peoples to choose the form of government under which they will live—the restoration of sovereign rights and self-government to those peoples who have been forcibly deprived of them by the aggressor nations.

To foster the conditions in which the liberated peoples may exercise these rights, the three Governments will jointly assist the people in any European liberated State or former Axis satellite State in Europe where, in their judgment, conditions require:—

(a) to establish conditions of peace;

(b) To carry out emergency measures for the

relief of distressed people;

(c) to form interim Governmental authorities broadly representative of all democratic elements in the population and pledged to the earliest possible establishment through free elections of Governments responsive to the will of the people; and

(d) to facilitate where necessary the holding

of such elections.

The three Governments will consult the other United Nations and provisional authority or other Governments in Europe when matters of direct interest to themselves are under consideration.

When, in the opinion of the three Governments, conditions in any European liberated State or any former Axis satellite State in Europe make such action necessary, they will immediately consult together on the measures necessary to discharge the joint responsibilities set forth in this Declaration.

By this Declaration we reaffirm our faith in the principles of the Atlantic Charter, our pledge in the Declaration by the United Nations, and our determination to build in cooperation with other peace-loving nations a world order under law, dedicated to peace, security, freedom, and the general well-being of all mankind.

In issuing this Declaration the three Powers express the hope that the Provisional Government of the French Republic may be associated with themselves in the procedure suggested.

6.—POLAND

We came to the Crimea Conference resolved to settle our differences about Poland. We discussed fully all aspects of the question. We reaffirmed our common desire to see established a strong, free, independent and democratic Poland. As a result of our discussion we have agreed on the conditions in which a new Polish Provisional Government of National Unity may be formed in such a manner as to command recognition by the three major Powers. The agreement reached is as follows:—

A new situation has been created in Poland as a result of her complete liberation by the

Red Army.

This calls for the establishment of a Polish Provisional Government which can be more broadly based than was possible before the recent liberation of western Poland. The Provisional Government which is now functioning in Poland should, therefore, be reorganized on a broader democratic basis with the inclusion of democratic leaders from Poland itself and from Poles abroad. This new Government should then be called the Polish Provisional Government of National Unity.

Mr. Molotov, Mr. Harriman and Sir A. Clark Kerr are authorized as a Commission to consult in the first instance in Moscow with members of the present Provisional Government and with other Polish democratic leaders from within Poland and from abroad, with a view to the reorganization of the present Government along the above lines.

This Polish Provisional Government of National Unity shall be pledged to the holding of free and unfettered elections as soon as possible on the basis of universal suffrage and the secret ballot. In these elections all democratic and anti-Nazi parties shall have the right to take part and to put forward candidates.

When a Polish Provisional Government of National Unity has been properly formed in conformity with the above, the Government of the U.S.S.R., which now maintains diplomatic relations with the present Provisional Government of Poland, and the Government of the United Kingdom and the Government of the United States will establish diplomatic relations with the new Polish Provisional Government of

National Unity, and will exchange Ambassadors by whose reports the respective Governments will be kept informed about the situation in Poland.

The three heads of Government consider that the eastern frontier of Poland should follow the Curzon Line, with digressions from it in some regions of five to eight kilometres in favour of Poland. They recognize that Poland must receive substantial accessions of territory in the north and west. They feel that the opinion of the new Polish Provisional Government of National Unity should be sought in due course on the extent of these accessions, and that the final delimitations of the western frontier of Poland should thereafter await the peace conference.

7.—YUGOSLAVIA

We have agreed to recommend to Marshal Tito and Dr. Subasitch that the agreement between them should be put into effect immediately, and that a new Government should be formed on the basis of that agreement. We also recommend that as soon as the new Government has been formed it should declare that:—

(1) The Anti-Fascist Assembly of National Liberation (Avnoj) should be extended to include members of the last Yugoslav Parliament (Skupshtina) who have not compromised themselves by collaboration with the enemy, thus forming a body to be known as a temporary Parliament, and

(2) Legislative Acts passed by the Assembly of National Liberation will be subject to subsequent ratification by a Constituent Assembly.

There was also a general review of other Balkan questions.

8.—Meetings of Foreign Secretaries

Throughout the Conference, besides the daily meetings of the heads of Governments and the Foreign Secretaries, separate meetings of the three Foreign Secretaries and their advisers have also been held daily.

These meetings have proved of the utmost value, and the Conference agreed that permanent machinery should be set up for regular consultation between the three Foreign Secretaries. They will, therefore, meet as often as may be necessary, probably about every three or four months. These meetings will be held in rotation in the three capitals, the first meeting being held in London after the United Nations Conference on World Organizations.

9.—Unity for Peace as for War Our meeting here in the Crimea has re-



affirmed our common determination to maintain and strengthen in the peace to come that unity of purpose and of action which has made victory possible and certain for the United Nations in this war. We believe that this is a sacred obligation which our Governments owe to our peoples and to the people of the world.

Only with continuing and growing co-operation and understanding among our three countries and among all the peace-loving nations can the highest aspiration of humanity be realized—a secure and lasting peace which will, in the words of the Atlantic Charter, "afford

assurance that all the men in all the lands may live out their lives in freedom from fear and want"

It is considered that victory in this war and the establishment of the proposed International Organization will provide the greatest opportunity in all to create in the years to come the essential conditions of such a peace.

(Signed) WINSTON S. CHURCHILL.
FRANKLIN D. ROOSEVELT.
J. V. STALIN.

The Globe*

A GEOGRAPHER'S REVIEW

By Professor E. G. R. Taylor

[IN the midst of a war, in which attention is focused upon human divisions, it is no bad thing to look for a moment at certain factors of economics and geography which affect the future of the human race as a whole. We are witnesses of the force of ideas, passions and sentiments which produce devastating wars and political deadlocks, but which are hardly connected, if at all, with geographical or material facts. It is these imponderables which make the course of world politics so difficult to predict, for in the past they have so often made hay of what are (to the economist) the plain requirements of common sense.

Yet sooner or later any plans or policies, national or international, which fail to take account of such inescapable facts as the disposition of the world's resources and population, or the range and the speed of modern communications are bound to come to grief. Every political theory, like every national tradition, has its roots in the more or less remote past. That has its advantage in stimulating loyalty; but it has this disadvantage, that the adherents of the theory or the tradition are apt to forget how different is the pattern of the material world to-day from what it was when their ideas first took root. What is the pattern? In tracing it, the author of this article freely expresses per-

THE CONQUEST OF DISTANCE FROM THE WHEEL TO JET PROPULSION

TE are living in a time-space revolution, though many of us still resolutely withhold our attention from it. Yet history shows that new inventions and discoveries which make possible new speeds and superior mobility have had decisive effects, not only in warfare, but upon the peace-time organization and mutual relations of States. It has even been suggested as a "law" by German writers upon Geopolitics that large States must grow larger, small States smaller and fewer, a process to be accelerated by the modern mastery of space through the radio and the aeroplane. We should now add to these accelerating factors (without necessarily accepting the conclusion) the new power of destruction at a distance by the flying bomb and the stratosphere rocket.

In antiquity the invention of the wheel, making possible the use of transport wagons and war chariots by the Sumerians, gave these people very decided commercial and military advantages over their more backward neighbours. Yet the movements of such clumsy vehicles, drawn as they were by asses, could not compare in speed with the mounted horsemen who appeared from the Steppes much later in history. When King Darius of Persia in-

sonal opinions, which we hope will provoke useful discussion.—Editor, "British Survey."]

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vaded the Ukraine with his infantry and transport asses he could never bring the light-armed and swift Scythian cavalry to battle. Leading him far into the interior they were able further to hamper his movements and to wear him down by a scorched-earth policy, such as the Russians have employed on the same terrain in our day.

The superior mobility of the Asiatic horsemen made them the scourge of Europe for a thousand years, and allowed them, when skilfully led, to build up vast empires. Harassed thus on the landward side, Christian Europe was exposed to a menace of similar origin from the sea; for the power of the Vikings to strike swiftly and unexpectedly was due to the mobility conferred on them by their superior sea-going ships. The Romans had tackled the problem of control through mobility from a different angle, that of the engineer. Their properly surfaced and cambered roads, planned so as to provide good accessibility to all parts of the Empire, at the same time enabled the legionaries to be moved to threatened points at speed. Improvements in roads, vehicles and ships, and in the strength and speed of transport animals, continued down to modern times. but all had their definite limits, which find expression, for example, in the pattern of distribution, throughout civilized lands, of post and coaching towns. These are spaced about twenty to twenty-five miles apart, with lesser centres at half and one quarter that distance, matching the average day's journey and the minor stages

A parallel development to that of the improved mobility of the fighting man has always been that of improved range for his missile weapons. The sling, the arrow, the catapult, all representing rudimentary action at a distance, were rendered obsolete by the invention of gunpowder, expelling missiles from muskets, mortars and cannon. It was this invention that once and for all brought about a new division of humanity. Whereas the simpler weapons could be furnished by any craftsmen, or even by the soldier himself, the newer types depended upon resources and technical skill that placed them outside the range of primitive peoples. The socalled backward and advanced races were thus more sharply differentiated than ever, and the eventual subjection of the former by the latter became inevitable, thus posing a problem of "world order" that has not yet been solved.

In the sphere of transport and mobility, however, the more fortunate people still had little technical advantage over the more backward until the age of steam. The network of

railways and steamship lines introduced an entirely new scale and range of movement, which not only made the political control of vaster areas possible, but also divided the civilized peoples of the earth in accordance with their willingness or capacity to develop largescale industry upon a basis of coal, iron and steel. The West diverged from the East, and the West could increasingly impose itself upon the A further consequence of the new mobility was the change in population pattern expressed by the growth of a relatively small number of great towns about sixty or seventy miles apart at the expense of the former large number of small towns. The tendencies thus outlined were accentuated by the introduction of motor transport, with the further consequence that tremendous advantages accrued to the accidenal possessors not only of coal and iron ore but of mineral oil.

The Age of Flight has suddenly stepped up the speed of travel tenfold. But it has done more than this. It has all but abolished the limitations upon accessibility and mobility set by geographical features. Mechanical land transport was tied to the road and the railway, costly to build, and although there was more freedom of movement at sea, fast steamships were increasingly tied to the limited number of sufficiently commodious harbours. Moreover, the insular and peninsular shape of the lands meant that world travel must be partly by land and partly by sea; on land, the route was governed and circumscribed by topography, while certain seas were rendered unnavigable by ice. The superior mobility achieved by air travel is therefore in terms not only of speed but of direct and universal accessibility. No part of the globe is out of reach by aeroplane, just as no part is out of reach by radio. The latter dispenses with the limiting wires and cables of telegraph and telephone, the former with road, railway and harbour. For although costly airports are needed to handle civil aviation, the experience of this war has shown that an airfield can be constructed almost anywhere, while the sea affords unlimited scope for the seaplane.

This tremendous revolution alone compels us to re-survey the world and its resources. Place as well as space values are transformed, and physical isolation promises to be banished. Equally important from the point of view of the relations of States is the parallel development of the missile weapon. There is no reason to suppose that 1,500 miles is the extreme distance from which an attack by heavy bombers can be launched, nor that 250 miles is the extreme range of the rocket bomb, which strikes

within five minutes of launching. Only Moscow. of all European capitals, is more than 250 miles from foreign soil, and only a country over seven million square miles in extent could include territory more than 1,500 miles from any land frontier. The strategic value of the buffer state, of the cordon sanitaire, and of so-called "narrow seas" as frontier zones has been greatly reduced. Needless to add that the crucial importance of the command of resources in coal, iron and oil, to say nothing of that range of less common minerals termed "strategic." has been magnified beyond assessment. Whether we term this present war a struggle for oil by means of steel, or for steel by means of oil, the truth remains that the Great Powers are the nations which between them have outstripped all the rest of the world in control of these commodities.

EFFECTS OF FLIGHT ON INTERNATIONAL RELATIONS

While at the present juncture it is natural to think of the new scale of movement of man and his inventions in terms of conflict, and while, too, it is necessary to emphasize the enhanced vulnerability and disadvantageous situation of the small State, there are other changes and other consequences of three dimensional movements which need careful consideration. Flight, from the mere fact that energy must be supplied to lift passengers and freight instead of dragging them over a comparatively frictionless surface, must always be more costly than land or water transport. Hence the closer contacts which it makes possible between man and man, nation and nation, have so far been limited to certain classes—politicians and administrators, business executives and salesmen, engineers, entertainers, professional men and the wealthier tourists. Even in Canada and the United States, where conditions for civil aviation have so far been the most favourable, there are a hundred rail journeys made for every one air journey, and elsewhere the discrepancy is even greater. Nevertheless, the war has already shown us the advantages to be reaped from the rapid personal contacts that can be effected between the representatives or heads of governments, and these might be one of the most helpful guarantees of effective common action to maintain future peace. Moreover, the average man or woman is given much enhanced psychological mobility in that it is no longer the case that taking up work overseas means being cut off from home and kindred by a journey of long duration. Days of travel have been reduced to hours, weeks to days.

Distance from home is also reduced in that one of the first functions of the civil aeroplane is the transport of mails and newspapers, while the principle of the airgraph letter will undoubtedly be developed. It is hardly realized, perhaps, that the micro-film can place all books, periodicals, documents and manuscripts published or preserved in any one country at the disposal of readers in any other, the whole contents of a national library being reduced to a negligible load by plane.

Apart from mails and newspapers, the forms of freight carried by air are limited to such things as can bear a high cost of transport or are needed in haste. Bullion and precious stones, drugs, samples, spare parts, objets d'art, films and flowers, make up the principal items. In exceptional cases, however, as where mining and other enterprises are developed in areas served by neither road nor rail (as in New Guinea) planes are used for the carriage of machinery and general stores: the remarkable achievements of the British and American Air Forces in the Burma campaign in supplying an Army with heavy equipment are full of lessons for the development in peace-time of inaccessible areas.

As is well known, the small size of Britain has placed this country at a disadvantage with the United States and even Europe in respect of the home development of civil aviation. The average distance between the big centres of population in the British Isles is only about 170 miles, well under an hour's flight. In Europe the corresponding figure is 700 miles, or about three and a half hours' flight; in America it is 1,350 miles, or nearly double as great. If we consider the average distance between all the great cities of the world, we find it of the order of 5,000 miles, or some twentyfive hours' flying time. The whole circuit of the globe is 25,000 miles, and as no one point can be distant more than half this circuit from another, the maximum flying distance to any part of the world whatsoever is a théoretical sixty-two and a half hours, or rather over two and a half days at cruising speed. Actually, of course, this figure would be increased 25 per cent. or more by halts necessary for servicing and refuelling.

THE PATTERN OF WORLD POPULATION Concentration in the Northern Hemisphere

Since the characteristic passengers and freight carried by plane are essentially urban, and derive mainly from the very large cities, the most frequented air routes will be those linking the great centres of population. Now the most

striking and indeed extraordinary fact about the world's population is that about four-fifths of the total numbers are concentrated in four great blocks upon areas of the order of one to three million square miles. All these areas are in the northern hemisphere, and the three most densely peopled are in the Old World. They are Europe as far north as latitude 60°, together with immediately adjacent parts of Asia and Africa; India with Ceylon; China with the adjacent island fringe including Japan. In the New World the block comprises the eastern United States only, with some immediately adjacent parts of Canada. If we choose a fairly central city in each of these areas we find the following distances between them: Chicago to Vienna, 4,760 miles (24 hours); Vienna to New Delhi, 3,500 miles (17) hours); New Delhi to Shanghai, 2,590 miles (13 hours). Empty or nearly empty spaces, affording little "pick up' traffic, separate these population blocks.

Within the compass of these four closely settled areas are to be found as many as thirtyfive cities with a million or more inhabitants apiece, and the sites of these cities influence in detail the routes followed by the chief airways. Among them are five multi-million cities, Greater London, Greater New York and Tokio with from seven to eight million inhabitants, Greater Berlin and Moscow with over four million each. It is by no mere coincidence that these are five cities of the five chief warring Powers. In the northern hemisphere there are two more "million cities," each relatively isolated and hence active centres of air traffic. They are Los Angeles in the Pacific Coast Belt of the United States, and Mexico City.

The Southern Hemisphere

In the southern hemisphere, with the whole width of the tropics separating them from their northern counterparts, there are five more cities with over a million inhabitants which can be readily reached only by air. Rio de Janeiro and Sao Paulo in Brazil, Buenos Aires in Argentina are the metropolitan cities of Latin America. Sydney and Melbourne, with the same function in Australia, are a reminder that largescale urbanization is not solely a phenomenon of industrialization. These two cities between them contain over half the total population of two States whose economy is overwhelmingly based on wheat and sheep. Moreover, they are the homes of over one-third of the population of the whole Australian continent, which is almost exactly the same size as the United States. Whatever may be the explanation of these facts and figures, one point to notice is

that they are ever present in the minds (and plans) of those peoples who feel their own countries to be over-populated.

To return, however, to the question of air-Apart from the general location of populous centres, particular commercial and political relationships help to determine their direction. There are, for example, only two million Europeans in the Union of South Africa, where, too, there is no city of more than moderate size; but, in common with the chain of British territories stretching northward as far as Egypt, and the more scattered colonies of West Africa, South Africa finds air travel specially advantageous, as the continent lacks an integral rail system. Cairo, not only as the largest African city, but because it is the natural junction between routes from the south and the major line of movement from west to east, has peculiar importance as an air-traffic centre.

The Great Spaces

As the case of Australia shows, area has no necessary relation to population, but it is generally agreed that a great area is the essential framework of a great Power, and air-travel, by placing all parts of an area of even vast dimensions within a day's reach of its metropolis, plays a most important role in fostering that community of outlook and sentiment which underlies national strength, as well as in facilitating centralized government. The present-day States possessed of dimensions which may be said actually to demand internal air-travel are seven in number. Soviet Russia is the largest, equal in area to the whole continent of North America. Canada, Australia, the United States, India, China and Brazil all come into this class, with over a million up to eight million square miles of territory. It is these that have that command of "great spaces" so coveted by Germany, yet among them only Russia and the United States rank as Great Powers in the fullest sense. China and India are weighed down by mass poverty; Canada, like Australia, has comparatively few people—twelve millions; while Brazil, with over forty million people and very great natural resources, is at present a rapidly changing "unknown." According to the diagnosis of the German Geopoliticians, China, possessed of all the requisites for it in the shape of area, population, climate and resources, has merely lacked the Will to Power. Brazil, on the other hand, lying mainly within the tropics, is debarred from greatness by her climate, which robs her people of the requisite energy. Both these propositions are of doubtful validity, nor need we accept from the same source the view that the sea-power, with its discontinuous territory, is "destined" to disappear before the land-power commanding resources on a continental scale.

Two Thousand Million Neighbours?

The world pattern of air-ways has been roughed out by the pattern of mutual business interests and political relationships, but it has made possible a new intimacy of social and cultural contacts which may well prove more important than either in the long run. Following the distribution of population groups, the main lines must run across the world in the northern hemisphere with a general west-east and east-west trend, with groups of feeders from the active extremities of the three southern continents. Subsidiary lines, so far as they are not merely local, will run out to parts of the world not yet fully developed—to the Arctic regions with their rich promise of minerals, to equatorial lands as yet clothed in jungle, to the remote heart-lands of the continents where "access to the sea" cannot even be dreamt of. And if we are to be actively constructive critics of our country's civil aviation policy, we must study, not the oblong world-map, which appeared to set bounds to the earth along the four margins of the page, but the globe which returns always upon itself. On the globe we can perceive the new relationships which can be established by air in every direction. before Columbus's day the almanack-makers amused their readers by jests about the globe. As, how John and Robert, starting off in opposite directions, meet again and dispute whether it is Tuesday or Thursday when actually it is Wednesday. In our turn, we may imagine an

airman setting his course one afternoon westward from Petsamo, and keeping along parallel 70° at a steady 360 miles an hour. Travelling in a perpetual afternoon he would find that time, as indicated by the sun, stood still. But when he reached home again he would be told that twenty-four hours had elapsed, and that while it was true that it was afternoon, it was to-morrow afternoon. He and his friends would be sure that he had gone around the world, but in fact he had only made a "small circle" about the Pole. On his way he had passed Fairbanks, Alaska, on his left. Should he really wish to fly to it directly his course would be not west but due north and then due south, with a saving of nearly three hours by the chronometer. This journey to Fairbanks would be shorter than if he turned south instead of north and flew over Leningrad to Wadi Haifa, in Egypt, which would seem incredible to anyone consulting Mercator's world map. The meagre and faulty geography of the English-speaking peoples has in the past fostered a dream of "splendid isolation" on both sides of the Atlantic Ocean. But once and for all that ocean has shrunk to the dimensions of a Channel, and our English Channel to the dimensions of a river. The population of the globe is becoming, willy nilly, two thousand million neighbours.

Note.—The British Society's Information Service answers without charge all enquiries from members of His Majesty's Forces relating to foreign countries, the British Empire and international affairs. Memoranda required as a basis of lectures and discussions are also prepared on request.

The R.A.F. Quarterly Prize Essay Competition, 1944

AN ADVANCE IS BEING PLANNED . . .

By Flight Sergeant J. S. Carter, R.A.F.

THERE is a woman who sits on a tombstone in the middle of a great stretch of country. Around her all is activity; people are moving—some quickly, some slowly, some confidently and some in muddled circles. She alone is still. Who is she?

"... She is Life:

That makes us keep on moving, taking roads,

Hauling great burdens up the unending hills,

Pondering senseless problems, setting sail For undiscovered anchorages . . ."

Every one of us is breaking fresh ground each day. We cannot stand still. The variety of our ventures is infinite, so that it is difficult to trace the trends of the movement of mankind.

¹ Ford Madox Hueffer: "The Portrait."

Generalizations are dangerous. But there are barriers that separate us into streams as we move on across country.

THE BARRIERS

One of these barriers is within our personalities. It is a disability, which tends to make us unable to appreciate the non-material side of the universe. The men and women of the Western civilization suffer from this disability to a marked degree. The Chinese, for example, never became so unbalanced. The Confucian ethic was not merely the subject of lip-service one day a week: it permeated the whole of life. The ethical idea of social virtue (" jen ") underlying the Confucian ethic meant the practical application of the proverb, "Do unto others as you would be done by." In family and social relationships the Chinese learned to exercise respect, magnanimity, earnestness and kindness; these made up the inner integrity of a man's life, dearer than life itself. Confucius said: "To be able from one's own self to draw a parallel for the treatment of others, that may be called 'jen.'" And this was applied in political and national life as well as in family and social life. Confucius taught that the essential of right government is personal rectitude; his statement in "The Great Learning" tells how the ancients ordered that their states:-

"Wishing to order well their own states, they first regulated their own families. Wishing to regulate their own families, they first cultivated their personalities. Wishing to cultivate their personalities, they first rectified their hearts. Wishing to rectify their hearts, they first sought to be sincere in their thoughts (to see things as they really are). Wishing to be sincere in their thoughts, they first extended to the uttermost their knowledge.

"Their hearts being rectified, their persons were cultivated. Their persons being cultivated, their families were regulated. Their families being regulated, their states were rightly governed. Their states being rightly governed, the whole kingdom was made happy and tranquil."

We of the West also have a word "gen." By it we mean information, knowledge of facts and figures, technical mastery of a subject. This contrast between our outlook and that of the great philosophers is something more than a chance pun: it is an example of a fundamental divergence of thought and action. We have developed a complex cortex, which gives us mastery over natural forces, but we have neglected the brain of intuition and emotion

2 Quoted by Winifred Galbraith: "The Chinese."

which alone can tell us how to control the monster we have made. Every day we are learning to travel faster, to wield more machine power—but we have forgotten how to find out where we are going in such a hurry. Our ethical beliefs have been crowded out. We plan "a better world," with bigger ships and faster aircraft and taller buildings and more money and radios and refrigerators for the masses. Now, after two world wars have shattered the doctrine of Progress, we are beginning to realize that quantity is not everything. As we see the material things into which we had built our life destroyed, we feel that there are things more important which are indestructible, values that rise out of the shambles, achievements of faith and genius that are still untouched. You cannot destroy a Beethoven Symphony.

These things are the products of the thalamus, the neglected brain of the spirit. But we find it hard to change the emphasis of our lives. The disease is too deep. We are not willing to believe that there is something within

us that must be put right.

And the result? Where the Chinese had a firm-based national life built upon the duties of the individual, ours is a toppling structure that must be propped up with promises. Where the Chinese never knew defeat because they absorbed their conquerors into their way of life, we are in danger of missing victory because in our spiritual poverty we tend to adopt not only the weapons but also the ideas of our enemies. Fundamentally, our mistake was not one of international relationships, or armament races, or slumps, or pools of unemployed; these are all symptoms of the malady of mankind. War is a symptom; the sickness will not be over when the fever of fighting has died down: the germs are in our lives. And when the war is over? We shall have an Armistice. Peace does not just happen. Spinoza said: "Peace is not the absence of war, but a virtue engendered by the strength of the soul." Peace has to be built. Where does the building begin? The answer is: at the foundations. The foundations are men and women and children. Society is only a large number of individuals: a new society demands new people. An unpopular doctrine this, for, as Lord Elton has pointed out, ". . . it is much easier to discuss the reform of Britain or Europe or the world, for all of which our personal responsibility is extremely small, than the reform of ourselves, for which no one but ourselves is responsible at all, and which we are likely to find extremely painful." Does this smell too much of religion?

Lord Elton: "St. George or the Dragon."

Perhaps it does. The situation demands nothing less.

There are other barriers. Perhaps their origin too lies deep in the personality, and with the reorientation of the personality they will be conquered. Meanwhile there are other ways of tackling them.

There is the barrier between the lovers of democracy and the lovers of civilization. At its worst it is seen between those who work for social and political reform as the road to a planned Utopia, an end in itself, and those who seek personal culture divorced from corporate development. Often the line of demarcation is not so clear, but the barrier is there.

The lovers of civilization see the dangers of building a drab world, where every man is not merely "as good as his neighbour," but as dull; where controls and red tape and forms in triplicate smother us from the cradle to the grave; where the wealth of individuality is swallowed up in the poverty of standardization. They want every man to develop in his own way. "Every man for himself," they say, and sometimes they mistake this for the doctrine of Liberty.

This is, indeed, freedom of a sort. But the lovers of democracy know that this freedom has meant freedom to compete, to fight for markets, to tread the weaker under, to exploit the many for the sake of the few. It is easy, they think, for the elephant to shout "Every man for himself" as he dances among the chickens. If they seem to spend all their time devising stockades for the elephant it is only because this is necessary before they can build pleasances for the chickens. They know that Liberty demands Law for its preservation, and that its price is eternal vigilance. They are the friends of man, and they can run a revolution and lop off heads for the good of the species.

But the friends of *men*, the civilizers, find that they can deal only with individuals, that they cannot love anything so vague as "humanity." They want to see virtue in the individual. So did Socrates, and Plato conceived the State as an institution having a *moral* end, aiming at producing virtue in its citizens. But without Liberty there cannot be virtue, "for virtue does not consist in doing right, but in choosing to do right."

When Plato pictured the ideal state he said it would be possible only when philosophers became kings or kings became philosophers. We might say that for us the problem is that the Lovers of Democracy should become Lovers of Civilization and the Lovers of Civilization be-

come Lovers of Democracy. The objection raised then was that the philosophers were the last people to be capable of ruling—they were either hopelessly impractical or thoroughly immoral. The objection now is that many people act as if the two ways of progress—Democracy and Civilization—were mutually exclusive.

This division is often caused by wrong education. Education, for the majority, stops at the age of fourteen. Boys and girls are treated as if they will have no leisure after that and no need for development; and this sort of education is so much a farce that the strength of a young person's character is seen not in acquiescence but in reaction. A young man who has been turned out to work without a proper perspective of life will feel his inferiority, and naturally enough he will support those to offer a panacea for social ills. His indignation turns to revolt; without changing society he cannot secure for his children a better chance than he himself was given. Is he to be blamed? Is he wrong? He is not wrong, but he only sees one side of the picture (he has never been shown the other side).

The lover of civilization too often sees only the reverse. Drawing inspiration from the beautiful and the great, he lives as far as possible in a world cut off from mean money-grabbing. The headlong competition of commerce is distasteful to him. Sweat disgusts him, yet his leisure is bought by the sweat of the artisan, even if the nearest he ever comes to the transaction is when he discusses his balance with his bankers. His education, too, has been limited.

The result is that we often find ourselves travelling alone, or at best in small groups. Most of us spend a good deal of time and energy slinging mud at the people on the other side of the wall. But they are not the enemy: we are moving in the same direction. The enemy is the mediocre multitude, the "passive barbarians" who are content to travel only in small circles, and who will not believe that here we have no continuing city.

An enemy is one who has not yet become a friend; and they will never become our friends so long as we are divided by sectarianism or insularity or intellectual snobbery. We must crack down on these things wherever we see them. Why should we be exclusive? Man is a gregarious animal, and he needs to develop his social institutions. He is also an individual, and he needs to rectify his heart. The two things are complementary, not contradictory. Some of us work on the rim of the social wheel, patching

^{&#}x27;Lord Hugh Cecil.

the outworn tyre while the new one is being moulded: some of us work at the centre, testing the axle for truth, because we know that its eccentricity makes smooth running impossible. Only when we are working as a team will it be possible for all men to enjoy such liberty that they will be able to lead the Good Life. Only then will the people who have been satisfied with mere conformity and orthodoxy and respectability see something bigger to live for and, seeing it, begin their journey.

This must be qualified by two observations: It is not to be assumed that the true way lies in compromise. Truth does not lie half way between extremes—you will never hit it by simply aiming at proportion in all things. It lies in the tension between extremes, and can only be found by adventure into all sides of life. And it must be emphasized that the primary consideration for each of us is the orientation of his own life. What do we live for? What are

the principles that guide us?

The answers to these questions will depend to a great extent on our education, and if they are vague it will be because our education is vague.

EDUCATION FOR LIFE

Many of us have been educated to work. but few of us have been educated to live. To be enduring, education must be more than functional, it must be moral. Ruskin's words, quoted by Sir Richard Livingstone, should be cut into the foundation-stone of every school: "Education does not mean teaching people to know what they do not know. It means teaching them to behave as they do not behave." It is not enough to be satisfied with Means: the Ends of life are all-important. To aim any lower than the Good Life is to fail before you begin. This aim presupposes a moral outlook on life, and necessitates a re-affirmation of Christianity and Hellenism as the sources of our spiritual civilization.

Aldous Huxley points out that wrong physical education is easy to detect, because it results in pain, but wrong mental education is difficult to detect, because distortion of the mind does not cause pain. Yet the results must come out —and they do—in widespread passive barbarianism. Our traditional English schooling, even for those who can afford the "best" schools, tends to turn out young people snobbish, repressed, good at games, hating the classics. You cannot put this right by introducing "Religion" as an additional subject on the syllabus, as many people seem to imagine. Even Sir Richard Livingstone writes of the

folly of failing to give religion "a large place" in education. If the Christian religion is to be applied it must permeate all our thought, conditioning our attitude to the whole of life. It is not enough to give it a place, even a large place. Religion in education is not a subject; it is more like an atmosphere. Where moral education is a reality children grow into constructive citizenship. Education then is a process without end. The soil is clean and fertile: the seed of culture will not stop growing because the hothouse climate of school is changed for the open air of industry or business or Service life. (This view is, in fact, amply justified from Sir Richard Livingstone's writings, which are full of the desire for a religious motivation in education, a deep moral inspiration sustaining and enriching all the practical instruction.)

In addition, the whole conception of teaching by "subjects" is open to question:-

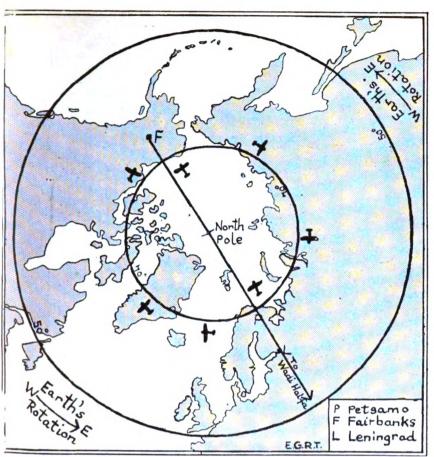
To teach a number of 'subjects,' entirely unrelated to their daily lives, is to guarantee for your pupils inevitable boredom, a difficult learning, and an all-too-easy forgetting. Children should learn as the human race learned; they should set out from the immediate and the concrete to discover the abstract, the general and the remote. History and geography should begin with the family and the native place. The Sciences must blossom out of the local flowers, must be born with the familiar animals, spring from the neighbouring rocks and waters, be deduced from the practice of the local crafts and industries. Geometry must arise as it arose among the Egyptians—from the measurement for practical purposes of definite individual spaces. Arithmetic must solve the actual problems of daily life. And so on." (Huxley gives an interesting account of how the Dalton Plan tackles this problem, even when working under the disadvantage of preparing pupils for competitive official examinations.)

The trouble has been that the "subjects" were never absorbed into everyday life, and a strong distinction was built up in the mind between school and the "real world." The aim of education is to produce a self-governing being, not a being to be coddled or diddled by others; to produce a being capable of teaching himself, not a receptacle for chunks of undigested knowledge; to produce a bright, curious individual, not a dim, self-satisfied model from the assembly line.

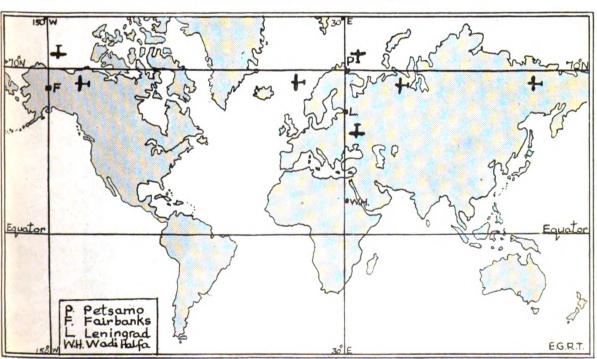
"Let our youth live in a healthful land, among beautiful sights and sounds, and

Aldous Huxley: "Proper Studies."





Map of the Polar Regions. Straight lines on this map give direct air routes



Mercator's World Map, excellent for an age of sea power, is of little help in tracing air routes

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A R.A.F. CATALINA passes low over Ceylon's coastline on returning from an ocean anti-submarine patrol

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absorb good from every side; and beauty streaming from the fair works of art shall flow into eye and ear, like an air bringing health from a world of health, and insensibly draw the soul into likeness and sympathy with the beauty of Reason."

This is "the attraction of the first-rate," of which Sir Richard Livingstone writes, and it typifies the sort of education we must secure for our children.

But for ourselves it is a little late. With us the seed of culture was seldom planted at all. We have missed the natural growth of moral education, and we have to do a job of transplanting which is always difficult and sometimes unpleasant. Or, to revert to our picture of life as a journey, we have very vague ideas about the aim and the end, and so we follow wandering stars.

This means two things: Leadership and Leisure.

LEADERSHIP

It means leadership because there is such a thing as inertia. We've got to start. We don't want to start. Therefore there must be an impetus, which can only come from leadership. But it must be the right sort of leadership. All of us have enough education to make us difficult to drive. None of us likes "being done good to" by patronizing superior beings. As G. K. Chesterton said: "There is the great man who makes every man feel small, but the real great man is the man who makes every man feel great." It is no use merely putting a notice on D.R.Os.: "There will be a compulsory Discussion Group for all personnel on Saturday at 1200 hours." S. P. B. Mais writes of the enjoyment he got through always being in the company of the first-rate. The habitual vision of greatness, he says, can only be kept by being habitually in the company of the great. This is a privilege that cannot be enjoyed by all of us; but at least we can feel that we are on the same road. There are great leaders in the R.A.F., men who do not depend upon imposed discipline, who by their personalities have created an atmosphere of comradeship in service. T. E. Lawrence found this sort of leadership among the Arabs; the only distinction was the unconscious power given a famous sheikh by virtue of his accomplishment. taught me," he wrote, "that no man could be their leader except he ate the ranks' food, wore their clothes, lived level with them, and yet appeared better in himself." War, the great leveller, reduces men to their moral stature;

'Plato: "The Republic."

bombast and bravado are no substitute for the personal rectitude which lies at the heart of true leadership.

Peace, too, will have its tests. This is a faithless and perverse generation, and it seeks after a sign. Fogged and mazed, we look for men who have been on the hilltops and who have seen the way ahead. Even in the cinemas, which provide our escape from reality, you sometimes imagine that you hear a muffled cry: "Is there a prophet in the house?" That is why Squadron Leader Ginnet's exhortation and the practical advice of S. P. B. Mais and the wise counsel of Sir Richard Livingstone have given encouragement to many people. This sort of leadership, through personal contact in Service life as well as in print, is what we need. It opens new vistas for the man who has become despondent and is in danger of becoming cynical:—

"I thought that my voyage had come to its end at the last limit of my power—that the path before me was closed, that provisions were exhausted and the time come to take shelter in a silent obscurity.

"But I find that Thy will knows no end in me. And when old worlds die out on the tongue, new melodies break forth from the heart; and where the old tracks are lost, new country is revealed with its wonders."

THE ATTRACTION OF THE FIRST-RATE

We must develop a sense of values. We must learn what to love, and to do that we need an introduction to the best and highest. Beauty has been thought of as an ornament to life, instead of an integral part of it. Plato, in his Symposium, says that the true order of going, or being led by another, to the things of love is to use the beauties of earth as steps, going from one to two, and from two to all fair forms, and from fair forms to fair practices, and from fair practices to fair notions, until from fair notions you arrive at the notion of absolute beauty, and at last know what the essence of beauty is.

The journey will be long. This is where Leisure comes in, because the only time at our disposal is our leisure-time.

Leisure

Leisure in modern life has become a problem in itself. If we are to live, and not merely avoid death, we must be able to exercise all our faculties, strenuously and effectively. Modern industry, with its dull, repetitive jobs, does not demand this sort of service (the worker tends

Rabindranath Tagore: "Gitanjali."

to become merely part of the machine)—and neither does life in the Forces, except for the few

The very fact that machines are becoming more efficient can buy us more leisure—but what is the good of that if leisure is to be used for little more than mental anæsthesia? For this is what happens: the apathy born of dreary time-killing during working hours is carried on, and play becomes not an individual, spontaneous result of joy, but an organized racket, a mechanized mass-amusement, a dope peddled for profit to the acquiescent.

Aristotle said that the object of education was to help men to use their leisure rightly. This may be an overstatement, but at any rate the use of leisure is a better test of education than the passing of examinations. By this test our educational system is revealed as inadequate in quantity and thoroughly inferior in quality. Wine, women and Woodbines are the subjects at the top of the average man's spare-

time programme.

Social centres are needed, where a community-spirit is fostered in relaxation, selfexpression and discussion. Here we can devote our leisure time to the pursuit of the best things, a task strenuous enough to counteract all the deficiences of routine. Here men and women with some experience of life can take up again the humanistic studies that were so dull in the days of their inexperience. The reintroduction can also be dull if it is approached in the spirit of academic exactitude. The need is for a provoking and intriguing introduction to literature, history and politics, perhaps on the lines of the introduction to good music which Dobson and Young have evolved and are practising with such splendid results. Every one has a latent and undeveloped appreciation of music; Dobson and Young have made people feel that they are already on the way. Starting from what is near at hand, they lead up to the greatest and the best, and the listener sees that there is no great gulf fixed between the initiated and himself; it is for him to exercise and expand the faculty of appreciation, that is all.

This method of making people feel that they are already on the way to the goal is too often neglected; it is much more common to find the emphasis laid on the distance of the objective and the difficulty of reaching it. However great the obstacles, it is better to start from what is near at hand to the learner. A student, faced with a question which completely baffled him, was told by his tutor, "Put down what you know." But..." "Put down what you know." He began to write. The answer that grew out

of his notes was not complete; it was neither orthodox nor strictly academic; but it had unusual breadth and a fresh sincerity.

The classroom atmosphere should be avoided because it brings up old associations—passive suffering, deadly boredom, dogma absorbed without question and without understanding. Learning is easiest and most attractive when thought and action go together, when theory is confirmed by experience and the point driven home with a double blow. Starting from what is near to us, we can often use the familiar media of cinema and radio, dramatise history, bring literature to life. From passive acceptance we can go on to active contribution. Air Vice-Marshal Thorold, in his article on the practical application of Education for Living. has given examples of how this is being done. The pity is that the provision of Station Centres is so incommensurate with the need.

THE GROUNDWORK

Two conditions of progress have been indicated: breadth and depth. If this advance is to be successful it must be wide enough to unite men and women throughout the Services whose primary persuasions differ, and wider still so that there shall be no exclusions on grounds of occupation, class or nationality.

Movements can easily be widened, but often they become shallow in the process. If such a cultural development is to be a real force it must go deep in the individual life. It must be more than an excrescence tacked on hap-

hazard.

The idea of Education for the Habitual Vision of Greatness is a great idea. This is the call for an advance, and the "military" virtues—courage, loyalty, endurance and discipline—are the very virtues needed to make it possible. Each of us has a part to play. Each of us must see that his own life is founded on true principles. We must cultivate our personalities, and wishing to do this we must first rectify our hearts; wishing to rectify our hearts, we must first seek to see things as they really are; wishing to see things as they really are, we must first extend to the uttermost our knowledge. Begin here.

Meanwhile, we shall do all in our power to broaden our horizons. We shall cultivate the community spirit. We shall break down the barriers wherever they rise to separate us, so that we can go forward, not as strangers, and yet not as goose-stepping automatons, but as an army of friends, an army of free men.

In the history books they will write: "An advance was made on a broad front."

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REALITY AND THE VISION OF GREATNESS

By Squadron Leader E. A. Morrison, D.F.C., R.A.F.V.R.

THE Vision of Greatness is something that is very pleasant to contemplate from an armchair in the mess, but Reality has an objectionable habit of disturbing our ruminations; and in doing so it does not stop to ask whether its manifestations conform to our theories or not. It is particularly important that any vision of life gaining currency in a fighting service should be very closely related to reality. for there is none so inescapable as war. The mind cannot imagine a fact of experience so absolute or so catastrophic as that which the German armies brought on Poland, on Holland or on France. So debilitated were we by the muddled intellectualism that was popular during the years between the wars that a similar disaster would have overtaken us but for twenty miles of Channel and the Royal Air Force.

This period was described by an air gunner, now dead, who was once the editor of a well-known monthly, as "the silly season in politics." Fortunately for us, Master Hun was busy at that time with a parcel of theories not more nearly allied to the truth than our own. His Weltanschauung has been very considerably upset by the attentions of an awkward reality in the shape of Bomber Command. If the vision of life, to which each of us in some degree contributes, cannot be made to conform more nearly to the reality than the shallow sociology which predominated during this season, we will prepare, and on a lavish scale, for the butchery of our children.

It is not sufficient to conceive of an ideal society; the problem, as Socrates suggested, is to find the citizens to put in it. For the supreme reality rests, not in events or schemes of government, but in persons. Besides a few miles of sea in 1940 we had a Churchill. We were hardly less blessed by Hitler, for each contributed to our salvation; the one by a vision of greatness that was undimmed by disaster abroad or folly at home, and the other by the meanness of mind that led him to devote his energies to humiliating the French at Compiégne rather than to exploiting the advantage that he had obtained over ourselves.

These two persons are inexplicable facts. In them lies the reality which has issued in the events now known as history. The Vision of Greatness has to do with persons. It resides in the mind and has human beings for its object. It is therefore a practical affair having to do with ultimate reality.

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In order to avoid loose thinking, it is well to determine what a person is made of. On the one hand it is a core of individuality distinct from other individuals. A major difference between civilization and a state of barbarism is that in the former the individual is regarded as important for his own sake. He is something more than an odd body in a tribe of Hottentots or Huns.

On the other hand the individual does not circulate in a void. It has been said that "A man without a country is either a beast or a God." The core fructifies in humanity because it is engrossed by certain relations. Some of these a man is free to choose for himself; others are forced upon him.

The more important of these relations have been crystallized in well-defined institutions. Men want to protect themselves against predatory peoples and individuals. They form a state or policy. They want to buy and sell, and an economic system comes into being. For the purpose of worshipping the Deity they associate in a church. These are undeniable forms of human experience. An anarchist does not believe in the state, or a pacifist in war. But he is taxed or bombed just the same. One notices remarkably few gods walking the streets. The individual is not superior to the concrete forms in which the human mind has in point of fact expressed itself, and the choice of these is to a considerable extent limited by nationality, economic status and similar factors. A fairly wide range of religious beliefs is available to Englishmen; but the aircrafthand who, claiming to be a Mohammedan, insisted on praying toward Mecca at fixed hours of the day, his forehead reposing on the ground, would be a to become merely part of the machine)—and neither does life in the Forces, except for the few.

The very fact that machines are becoming more efficient can buy us more leisure—but what is the good of that if leisure is to be used for little more than mental anæsthesia? For this is what happens: the apathy born of dreary time-killing during working hours is carried on, and play becomes not an individual, spontaneous result of joy, but an organized racket, a mechanized mass-amusement, a dope peddled for profit to the acquiescent.

Aristotle said that the object of education was to help men to use their leisure rightly. This may be an overstatement, but at any rate the use of leisure is a better test of education than the passing of examinations. By this test our educational system is revealed as inadequate in quantity and thoroughly inferior in quality. Wine, women and Woodbines are the subjects at the top of the average man's spare-

time programme.

Social centres are needed, where a community-spirit is fostered in relaxation, selfexpression and discussion. Here we can devote our leisure time to the pursuit of the best things, a task strenuous enough to counteract all the deficiences of routine. Here men and women with some experience of life can take up again the humanistic studies that were so dull in the days of their inexperience. The reintroduction can also be dull if it is approached in the spirit of academic exactitude. The need is for a provoking and intriguing introduction to literature, history and politics, perhaps on the lines of the introduction to good music which Dobson and Young have evolved and are practising with such splendid results. Every one has a latent and undeveloped appreciation of music; Dobson and Young have made people feel that they are already on the way. Starting from what is near at hand, they lead up to the greatest and the best, and the listener sees that there is no great gulf fixed between the initiated and himself; it is for him to exercise and expand the faculty of appreciation, that is all.

This method of making people feel that they are already on the way to the goal is too often neglected; it is much more common to find the emphasis laid on the distance of the objective and the difficulty of reaching it. However great the obstacles, it is better to start from what is near at hand to the learner. A student, faced with a question which completely baffled him, was told by his tutor, "Put down what you know." But..." "Put down what you know." He began to write. The answer that grew out

of his notes was not complete; it was neither orthodox nor strictly academic; but it had unusual breadth and a fresh sincerity.

The classroom atmosphere should be avoided because it brings up old associations—passive suffering, deadly boredom, dogma absorbed without question and without understanding. Learning is easiest and most attractive when thought and action go together, when theory is confirmed by experience and the point driven home with a double blow. Starting from what is near to us, we can often use the familiar media of cinema and radio, dramatise history, bring literature to life. From passive acceptance we can go on to active contribution. Air Vice-Marshal Thorold, in his article on the practical application of Education for Living. has given examples of how this is being done. The pity is that the provision of Station Centres is so incommensurate with the need.

THE GROUNDWORK

Two conditions of progress have been indicated: breadth and depth. If this advance is to be successful it must be wide enough to unite men and women throughout the Services whose primary persuasions differ, and wider still so that there shall be no exclusions on grounds of occupation, class or nationality.

Movements can easily be widened, but often they become shallow in the process. If such a cultural development is to be a real force it must go deep in the individual life. It must be more than an excrescence tacked on hap-

hazard.

The idea of Education for the Habitual Vision of Greatness is a great idea. This is the call for an advance, and the "military" virtues—courage, loyalty, endurance and discipline—are the very virtues needed to make it possible. Each of us has a part to play. Each of us must see that his own life is founded on true principles. We must cultivate our personalities, and wishing to do this we must first rectify our hearts; wishing to rectify our hearts, we must first seek to see things as they really are; wishing to see things as they really are, we must first extend to the uttermost our knowledge. Begin here.

Meanwhile, we shall do all in our power to broaden our horizons. We shall cultivate the community spirit. We shall break down the barriers wherever they rise to separate us, so that we can go forward, not as strangers, and yet not as goose-stepping automatons, but as an army of friends, an army of free men.

In the history books they will write: "An

advance was made on a broad front."

REALITY AND THE VISION OF GREATNESS

By SQUADRON LEADER E. A. MORRISON, D.F.C., R.A.F.V.R.

THE Vision of Greatness is something that is very pleasant to contemplate from an armchair in the mess, but Reality has an objectionable habit of disturbing our ruminations; and in doing so it does not stop to ask whether its manifestations conform to our theories or not. It is particularly important that any vision of life gaining currency in a fighting service should be very closely related to reality, for there is none so inescapable as war. The mind cannot imagine a fact of experience so absolute or so catastrophic as that which the German armies brought on Poland, on Holland or on France. So debilitated were we by the muddled intellectualism that was popular during the years between the wars that a similar disaster would have overtaken us but for twenty miles of Channel and the Royal Air Force.

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In order to avoid loose thinking, it is well to determine what a person is made of. On the one hand it is a core of individuality distinct from other individuals. A major difference between civilization and a state of barbarism is that in the former the individual is regarded as important for his own sake. He is something more than an odd body in a tribe of Hottentots or Huns.

On the other hand the individual does not circulate in a void. It has been said that "A man without a country is either a beast or a God." The core fructifies in humanity because it is engrossed by certain relations. Some of these a man is free to choose for himself; others are forced upon him.

The more important of these relations have been crystallized in well-defined institutions. Men want to protect themselves against predatory peoples and individuals. They form a state or policy. They want to buy and sell, and an economic system comes into being. For the purpose of worshipping the Deity they associate in a church. These are undeniable forms of human experience. An anarchist does not believe in the state, or a pacifist in war. But he is taxed or bombed just the same. One notices remarkably few gods walking the streets. The individual is not superior to the concrete forms in which the human mind has in point of fact expressed itself, and the choice of these is to a considerable extent limited by nationality, economic status and similar factors. A fairly wide range of religious beliefs is available to Englishmen; but the aircrafthand who, claiming to be a Mohammedan, insisted on praying toward Mecca at fixed hours of the day, his forehead reposing on the ground, would be a

source of some anxiety to the Station Warrant Officer.

So firmly established were most of these institutions during the hundred and fifty-odd years before the outbreak of this war that the singularly pernicious doctrine arose which stated that the individual was in some way determined by the various entities of which he was a member. It was a sort of mathematical conception of humanity: nationality plus education plus the age equals Blackie. Nothing could be more illusory. It is true that this state of affairs more or less prevails among Hottentots and Huns. Among neither has the individual choice in his beliefs or liberty in his actions. But the tribes of Central Africa had no history worthy of the name before the advent of white people. Their story was a bare record of brute conflicts and animal migrations. If the states of Europe were to sink into a dull totalitarianism in which individual initiative or originality of thought were obliterated, an equally dark age of turgid movement, unmarked by any achievement of greatness, would persist until the human spirit reasserted itself and personal humanity was once more discovered.

The shapes of these institutions do not make human beings; they are manifestations of human consciousness, for we stand not in a single relation to the corporate bodies of which we are members, but in many. The nature of the relations is largely a matter of choice, and history is the account of human actions as they have revealed themselves in interactions between society and society, or else between society and individual.

The State, for example, keeps Huns from our houses and secures for its citizens certain rights as between one another. These activities are recognized to be good and necessary and obtain the co-operation of most citizens. It is, moreover, an entity possessing some spiritual qualities. When it obliges men to give up their lives, they put themselves in a posture to do so pretty gladly for some years, after which they think that the mere process of living is acceptable in itself. There is little doubt that in patriotism and the love of family imperfect mortality attains more nearly to self-sacrifice than in any other experience. On the other hand the State exacts from us large payments of money, and these obtain the willing acquiescene only of very good or very foolish men. It may embark on a course of legislation which some men feel to be injurious to its best interests or likely to involve a gross violation of their own rights. There must be very few great men who have not at some period found themselves in violent opposition to the policy or the institutions of their times.

It must be added that certain classes of people such as burglars, or the gentry whose patriotism during the past four years has taken the form of a liberal indulgence in strikes, merely exhibit a rank incomprehension and savage ignorance, whether of any form of polity or of the urgence of events. Thinking themselves gods, they are beasts.

The Service, like the State, has various impacts on its members. It arouses feelings of loyalty, good fellowship and pride in its achievements. Some of its regulations, on the other hand, we think are tiresome. There are features of its operations or administration which we criticize and try to improve.

In great nations this interaction is suitably adjusted. It is the source of greatness. Immature societies, or those in which the sense of balance has decayed, are sunk in tyranny or groggy with revolution.

To recapitulate, a person is made up partly of a certain essential core or kernel of individuality and partly from the action and interaction between this inner substance and institutions and events. The form of this interaction is not single or determined but varied in the highest degree. It partakes, moreover, of the nature of ultimate and inexplicable reality.

Plato remarked in his off-hand way that a knave cannot judge an honest man because he has not the pattern of honesty in him. Neither can a mean man judge a great one unless the pattern of greatness is implanted in his mind. The striker or the burglar would think that Blackie was a sucker. But, further, he is incapable of appreciating the reality, for this resides in the multiplicity of human relations, and greatness, whatever it may be, emanates from them. It is essential to them and the inevitable concomitant of human actions.

To discover the nature of greatness, therefore, it is necessary to estimate human motives and the quality displayed by persons beneath the impact of events. Now persons, like some other sorts of reality, are tiresome in that they resolutely refuse to be classified or to act in accordance with pre-conceived ideas of behaviour. That we are always trying to subdue them to some set of formulæ or other is a sign of pronounced intellectual weakness. Of all the silly ideas that circulated after the last war, for example, there was none sillier than that war would be impossible in future, because it was condemned by public opinion. This was largely the hobby of President Wilson who, beneath the impact of events, belied the hopes of great-

ness placed in him more conspicuously than any other statesman of the period. For what, when examined, did public opinion prove itself to be? It was the opinion of President Wilson and of those airy and unwise individuals who thought like him. This public excluded entirely the Russians, the Poles, the Germans, the Italians and the Japanese. These peoples refused to act according to the President's pretty formulæ. Had he been a greater man, possessed of a more profound mind, he would have realized not only that the characters and institutions of the European nations are irrevocably varied, but that the war produced in them effects that differed very widely.

Herr Hitler was animated by ideas of a new order that were no doubt very nice in their way. They have had this disadvantage, that no very large number of Englishmen, or of other nationals but Germans, could be found who would subscribe to them.

If we do not examine our own political ideas very carefully and their applicability to other peoples, we will debilitate our own nation and produce misery for others. The vision of greatness does not consist merely in the pleasing contemplation of the particular set of fancies in which we may indulge with the least difficulty. To attain it involves an arduous process of education in which the conflicts between men and institutions and events are very fully realized.

Education is sometimes thought of as something vague, expensive and determinist, which, if issued in adequate quantities, inevitably produces universal equality and consequent happiness. But the best education in the world will not make a wise man out of a fool, or a brave man out of a coward. Silk purses are not made out of sows' ears.

In point of fact there are three senses in which the word is used. First it is spoken of as the equivalent of technical training. People who think themselves very practical often speak as if this were all that was required. The view need not detain us. Man has a purpose other than to be a plumber. Second, it may be taken to be the process of schooling by which are inculcated the mental and spiritual qualities necessary for a good life. Finally, it has appealed to the imaginations of some people as the entire process of living, in which all the world is a university revealing in successive stages of existence numerous and brilliant facets of the truth.

The two latter meanings of the word concern us here.

Education in the vision of greatness is to

imprint the pattern of greatness on the mind. This, as we have seen, is inseparable from what may be termed the moral realities found in the various relations between individuals and society. The purpose of education therefore is to enable the individual so to appreciate these relations that he may fill his place in society with some satisfaction to himself and some usefulness to others.

It is well in this connection to begin with the sow's ear—the matter of society—the self—the citizen who is to be put into the polity. A scheme of education that does not take account of the limitations both of educated and educators, and of the very great differences that inevitably subsist between individuals, will most certainly turn out bad citizens and a crackbrained state. We cannot all have the courage of Blackie or the intellect of the Prime Minister, any more than we can start our lives with the material advantages possessed by the latter, or recapture the spirit of the brilliant period in which he grew to manhood.

On the other hand, we can imitate both in their high conception of duty, in the generosity of their judgments, in the loyalty of their personal relations. The individual provides the spring and animus of any service. Although it is true that an organization has a certain momentum of its own, the quality of a fighting force depends, in the long run, on the contributions that its members will make in their several degrees. The emphasis of education must therefore lie in the directions first of individual action, and second of positive appreciations. The process of schooling, moreover, must provide a basis for a critical realization of his place in the Service and in the State, which will be enhanced and vivified as a man grows older.

For an individual can lead a good life only if his relations with others are rightly arranged. This education should secure. An aircrew—a long-lived one at any rate—is something more "than a list of lawless resolutes." It develops a personality of its own, expressing itself in its achievements. A nation, similarly, is known by what have been termed its "Institutions." These are to a considerable extent governmental: representative assemblies, the monarchy, the civil service, the law. But a mere study of these will not afford an understanding of the peculiar richness of the English political experience, which remains a mystery as much to vulgar sociologists as to foreigners. It is based on the deep democracy of sentiment which has enabled the very widest variety of individuals to make their different contributions to the national life. In no other nation of Europe would it have been possible, during the past century, for a legislative assembly to have comprised and to have utilized the services of men so entirely different in character as Gladstone, Disraeli and Lord Hartington. The figures who occupy the public stage to-day are hardly less diverse: Lord Halifax, Mr. Bevin, Lord Beaverbrook. This variety we must at all costs strive to preserve.

But not all institutions, in the sense in which the word is used here, are governmental. They include everything of a more or less stable nature which may be taken as characteristic of the spirit of a people. The English are preeminent among the nations of modern times in politics; they are equally pre-eminent in poetry. He who has no knowledge of English literature with its peculiar emphasis on solidity of character is as ignorant of the English nature as if he were blind to their political genius. The Church is an institution deeply imbedded in the national consciousness. During the past hundred-odd years Punch may be said to have attained the dignity of an institution, and latterly The Times. Clubs and associations, as they come and go in English life, are institutions, and most certainly the public house. But it is improbable that any large number of hours in the syllabus need be allocated to the consideration of the last-named, which may be safely left to the keenness of personnel during periods of home study.

These institutions are the framework in which Englishmen have attained greatness. They are the achievements in which England has shown itself to be a great nation. They undergo mutations during the course of years, some of which are due to external causes such as wars or economic forces; others of which are less readily explicable. The national character itself probably alters somewhat during the centuries, but these changes are certainly less pronounced than they appear superficially. There is little danger that the nation will lose its political genius during our lifetime. As far as others go, we deceive ourselves if we think that the Hun will lose his warlike character by a mere change of régime.

The major expressions of the human mind, the matter on which it has worked, are the fit subject for education. The institutions of one's country must be studied not in a spirit of idle adulation, still less in a spirit of fatuous criticism, but with a view to practical appreciation.

It is essential to form some fairly accurate idea of the purposes of the various governmental organs and of their limitations. Among

many tribes of Africa the prevalent opinion was that the priest-king should be responsible for the health of the community, the fertility of the earth and the abundance of fish in the sea and rivers; if the country suffered in any of these respects he was deposed from his office or killed. It would sometimes appear that a darker superstition exists in these islands, that prosperity and happiness can be brought about by law.

But institutions are not abstract ideas; they must be considered by reference to the men who made them. The necessity of the times has been as insistent in the past as it is to-day. It is a mean mind that attempts to foist on history the social conceptions and judgments that happen now to be fashionable. There are many great men who, if they had their lives to live again, might show some reluctance to be guided exclusively by the principles laid down by some arrogant and ill-educated academic. account of the development of institutions must be enlightened by the vivid appreciation of the biographies of the persons who have acted nobly in their generations. So will substance be given to the vision of greatness.

To-day it is necessary to create much that is new for the simple reason that a large part of what was once civilization no longer exists. One has only to walk on the street to see destruction and disruption in this country; across the Channel order and anarchy are waging a war of which the issue is still doubtful.

But the world has seen a good many New Orders since Napoleon. Very soon do they become tarnished and subordinated to the enduring ends of human action. We must not suppose that we are superior to the course of history. The delusion has been widely prevalent during the past half century, and many people still appear to labour under it. Like mules they are ashamed of their ancestry and careless of posterity. But history has had the best of the argument. In this day we have seen barbarism on the Continent of Europe blacker than any that has been known since the fifteenth century. Not an element of barbarism is lacking: torture, butchery, starvation, spiritual desolation.

Of the qualities by which the Prime Minister has shown himself to be a great man, not the least remarkable is his strong sense of the urgency and continuity of history and of the place of the nation at this present time in the sequence of events. History is the account of human actions which we must understand if we are to contribute to it in any degree of greatness. Unimaginative imitation is as much to be avoided as uninstructed innovation. But

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only by the judicious examination of the institutions and events of the past may we hope to make the actions of the present beneficial for the future. By consulting accumulated experience we may avoid what Burke has called "A dull uniformity in mischief and the unpitied calamity of being repeatedly caught in the same snare."

A person instructed in those forms of experience that are applicable to himself and to his nation must inevitably attain to some perception of greatness. If he does not, the education is grievously at fault. He will learn to appreciate, moreover, his own relation to the various bodies of which he is a member. Applying his mind critically but with imagination to institutions and to the men who have taken part in their evolution, he will come to realize his own purposes, capacities and limitations. He will be enabled to have such confidence in the demands of his own personality, as well as in those of the Service and of the State, that he will be able to act with some benefit to others as well as to himself.

Finally, a nation can show itself to be great before the world only if its citizens are imbued on the one hand with faith in their own way of life, and on the other with a just estimate of the nation's place in the concourse of mankind. A man will understand others when he understands himself; his opinion of himself will be very false if he has no knowledge of the accomplishments of other men. Britain's contribution

to civilization has been of the highest degree of greatness. We may ensure its continuance by a rational appreciation of its nature, a penetrating comprehension of the institutions of the peoples with whom we most have to deal, and a firm realization of the forms in which international intercourse does, in fact, take place.

So the vision of greatness extends to man in all the multifarious relations in which he is enveloped. Each of us may share in it accord-

ing to his lights.

To conclude, the education in the vision of greatness, if it is to be nearly related to reality, must imprint the pattern of greatness on the individual mind. For this the first essential is to develop a high standard of conduct and of mental capacity. The vision of greatness will not be attained either by a knave or a fool. Second it necessitates the appreciation of some of the major forms of experience in relation to which men have, in point of fact, shown themselves to be great. These, however, are not to be studied as lifeless entities, but in the spirit of the nation and of the men who have evolved them in the concatenation of circumstances. The impact of the times must never be forgotten, nor that of nation on nation. In these do nations show themselves to be great.

Imbued with the knowledge of these forms of human action, the individual will appreciate his own place in the general scheme and make the worthy contribution to the great society which is the true attainment of greatness.

The Royal Air Force in 1944

THE year 1944 memorable for the battles to liberate Europe, was for the Royal Air Force a year of sustained and intensive operations, greater in scope and more massive in power than at any other time in the history of air warfare.

In 1943, with the achievement of Allied air superiority, came the fulfilment of planning in the past. 1944 brought that planning to fruition. In scientific aircraft devices, in weight of attack, in tactics, in range and in the skill of the pilots, the enemy was surpassed in every theatre of war. Moreover, this steady increase in R.A.F. strength was paralleled by the air forces of the United States.

Tactically, the lessons of the past had been well learned, culminating in the re-entry of the Allies into North-West Europe, when the German Air Force was swept from the skies and

our armies were given such close and continual air support that their task was substantially eased and their casualties vastly reduced. On land and also at sea, that immense air support in the naval and military operations which took the Allies back to the Continent clearly demonstrated the value of flexible air power in combined campaigns against the enemy.

THE WORK OF BOMBER COMMAND

When the year opened, R.A.F. Bomber Command was still engaged in the strategic bombing of Germany. The Command was expanding in numbers and still more in striking power in the early part of 1944, and the tonnage of bombs dropped on enemy targets in the first quarter of the year was more than double that of the corresponding period of 1943—58,000 against 28,000 tons. The increase was even more pro-

nounced in the second quarter, when the weight of bombs dropped advanced to more than 127,000 tons.

The Battle of Berlin, begun in November, 1943, continued until the end of March, 1944, and it is estimated that the equivalent of twenty working days for every one of Berlin's 980,000 industrial workers was lost during the campaign.

That battle was followed by a sustained assault upon various targets—particularly railways—in the occupied countries. In preparation for the offensive in France, the Allied Air Forces had first to disrupt the enemy's communications system, and of eighty important railway centres in France, Belgium and Western Germany scheduled for bombing, about forty were assigned to R.A.F. Bomber Command. This involved a new and most difficult task. for whereas in the strategic bombing of the Reich the aim was to devastate large industrial areas, including those which produced fighter aircraft and ball-bearings, the targets in the railway offensives were much smaller and demanded the greatest accuracy. It was here that the technique of the Master Bomber, first used by the Pathfinder Force at Turin and on Peenemunde in 1943, became so successful, and by D Day on 6th June, Bomber Command had gravely damaged thirty-seven railway centres. Meanwhile, persistent Allied bombing attacks were being made on V-weapon sites and stores in Northern France.

After D Day the offensive against transport centres, although still vigorously maintained, ceased to be the most important part of Bomber Command's work and the tonnage of 46,000 dropped on communications during the second quarter of the year decreased to 14,000 in the next three months. New targets, however, now called for attention. The German-held French ports alone received 26,000 tons of bombs, and in support of the Army a great tonnage was delivered, by day as well as night, on enemy troop concentrations and other military targets in the field.

In June the assault began on the ten Ruhr synthetic oil plants, which by September were all out of action—at least for the time being—after 10,000 tons of bombs had been dropped on them. The attack, however, had to be sustained, as the German's shortage of oil drove him to constant repairs, and although the enemy's production showed a slight increase in October and November, by December the plants were again out of action.

In the meantime the offensive against the Reich as a whole continued and 44,000 tons were dropped in the period July to September.

In October the second Battle of the Ruhr was opened, for in this area, badly damaged though it was, much reconstruction had taken place. Moreover, with the battle front now only forty miles away from it, the Ruhr could serve the enemy as a great advanced base, especially valuable because of its intricate transport system, the most highly developed in Europe.

Accordingly, Bomber Command, in conjunction with the American Air Forces, set out to destroy the factories still working there and to disrupt the road, rail and water communications. Cologne, Essen, Duisburg and Dortmund had very heavy attacks, sometimes of more than 4,000 tons in single attacks. Cologne, in fact, received over 9,000 tons in four days. Both railways and factories were primary targets, and then came the turn of the waterways, which were disrupted by the breaching of the Dortmund-Ems and Mitteland Canals, on which an enormous volume of traffic was being carried.

History may, perhaps, record that the most dramatic achievement of Bomber Command during the year was the sinking of the *Tirpitz* by a small force of Lancasters, which proved that no warship can long survive when heavy shore-based aircraft are able to press home their attack. At the same time, throughout 1944, the arduous, though less spectacular, programme of mining went on and helped to prevent U-boats and other craft from seriously interfering with the Allied offensive in Europe, and disrupted the German sea communications in the Baltic.

Strategically, the perfection of devices and equipment and the operational control of a force by the Master Bomber have combined with increased bomb loads and new and more devastating bombs—including the 12,000-pdr. and the latest incendiaries—to produce unexampled success in attack. Precision bombing by day and by night, and the increase in Bomber Command's daylight assaults because of our air superiority, have been among the outstanding characteristics of the year's operations.

Indeed, the greatly increased tonnage dropped in 1944 is due partly to the fact that Bomber Command was active by day as well as by night, keeping up its offensive, when necessary, all round the clock. From mid-June, when the first large-scale daylight attack of the year was made against E-boats and E-boat pens in Le Havre, until December, daylight attacks were frequent, while Mosquitos in greater numbers than ever before maintained the attacks on Berlin and other industrial centres. Formed into Bomber Support Squadrons, Mosquitos

also accompanied the heavy aircraft on operations, with the consequent destruction of a considerable number of enemy night fighters and a greatly reduced casualty rate of our bombers.

FIGHTER COMMAND'S NEW TASKS

For Fighter Command the year 1944 was the most varied of its existence. For the first six months the Luftwaffe rarely appeared over Britain—apart from the series of swift bombing attacks mainly on London early in the year—and it was not until June that the Command shot down appreciable numbers of enemy aircraft. In that month 136 enemy aircraft were destroyed, 118 of them at night, by Mosquitos which maintained continuous nightly patrols in the Normandy beach-head area. In the whole year Fighter Command destroyed over 700 German aircraft, more than 500 of them by night.

Besides its protection for land and sea forces when D Day came, the Command was faced with a new task when the flying-bomb attacks began against London and Southern England in June. While still carrying out its 24-hour offensive across the English Channel, fighter pilots destroyed nearly 2,000 of the bombs within about three months. Meanwhile, equally heavy toll has also been taken of the missiles by Anti-Aircraft Command. As another important part of the counter-measures, the R.A.F. balloon barrage, comprising over 1,700 balloons, was provided within a few weeks. Hundreds of new balloon sites were established, 5,000 miles of telephone cables laid, and more than 3,000 vehicles assembled in record time. In all, balloons accounted for the destruction of nearly 300 flying bombs.

Intruders flying over enemy airfields at night, and effectively attacking other military objectives, form one of the specialist arms of Fighter Command, and Mosquitos have swept far out into the Bay of Biscay, Norway, and the Baltic—sometimes on patrols of more than 1,000 miles—destroying enemy aircraft in the air and on the ground. On other operations, long-range Mustangs and Spitfires have given escort to the squadrons of Bomber Command, frequently on operations deep into Germany.

Towards the end of the year (when the Command changed its title of Air Defence of Great Britain and reverted to the name of Fighter Command) bomb-carrying Spitfires with specially trained pilots were employed on a further new duty—to attack V2 installations in Holland, a task requiring exceptional fortitude and accuracy.

Working under the Command, the Royal Observer Corps has kept unceasing watch for enemy activity over Britain and has been plotting the movements of Allied aircraft.

SECOND TACTICAL AIR FORCE

The 2nd T.A.F., formed late in 1943, was used for the first six months of its existence chiefly against V-weapon installations, which were also attacked by American Air Forces.

One of its most important tasks, however, had been virtually to eliminate the German radiolocation stations in Northern France, so that the Liberation Forces were able to land in Normandy with infinitely less danger of detection at sea than would otherwise have been possible. With the advent of D Day, 2nd T.A.F. at once showed its flexibility and value, particularly in the battles at Mortain, the Falaise Gap and the Seine crossings, during the advances to Eindhoven, and at Walcheren. At each stage the air operations had a decisive effect on the land situation.

Road "strafing" operations by the 2nd T.A.F. are one example. On 19th August, for instance, as the Germans were trying desperately to escape from the trap at Falaise, the T.A.F. claimed about 3,000 vehicles knocked out, while in the subsequent land operations, when the enemy's convoy discipline was lost, T.A.F. took toll of approximately 1,000 vehicles a day.

Another outstanding performance of 2nd T.A.F. was its contribution to the first airborne landing, when the 2nd British Army, striking up the Hasselt-Eindhoven road to join the airborne troops, was met by withering fire from 88 mm. guns. The position was critical until the Typhoons were called in to clear the flanks and deal with the guns. Eight rocket-firing aircraft swept up and down the road at fiveminute intervals, and our tanks and armoured vehicles were able to continue their advance. Typhoons and Spitfires played a great part also in support of the naval landing at Walcheren, although the weather was so bad that normally flying would not have been attempted. In the latter part of the year the 2nd T.A.F. took its share in the dislocation of the railway system in Western Germany.

Since D Day the T.A.F. medium bomber group of Mosquitos, Mitchells and Bostons has carried out over 16,000 sorties and claimed the destruction of nearly 3,000 railway wagons, as well as making attacks on many other special targets.

Working intimately with Army ground schemes, T.A.F. fighters have developed their close-support tactics, destroyed gun positions.

strong-points and observation points within sight of our own troops. Another group of the 2nd T.A.F., formed to provide air defence for the base headquarters of operational groups on the Continent, has destroyed since D Day more than 200 enemy aircraft at night over the Western Front.

In all, since D Day aircraft of the 2nd T.A.F. have fired about 130,000 rockets, dropped some 25,000 tons of bombs on German ground forces and communications and flown roughly 140,000 sorties in close support of the Allied armies.

THE ROLE OF COASTAL COMMAND

For R.A.F. Coastal Command, which works in co-operation with the Royal Navy, D Day marked the culmination of many months' preparation, and set a seal upon its previous victories over U-boats. Great numbers of enemy submarines were defeated in an enemy attempt to pass through the south-western approaches to the English Channel, and when the full account of the Command's anti-U-boat operations may be revealed, it will demonstrate the power of the air in the war at sea.

Throughout the year Coastal Command's Strike Forces persistently attacked enemy shipping, and some of their most successful work

was done from D Day onwards.

During 1944 the Command sank some forty merchant ships, totalling about 120,000 tons, and damaged approximately fifty others totalling between 80,000 and 90,000 tons. Three destroyers and at least forty other vessels were sunk. A further three destroyers and a great number of other vessels were damaged. The number of merchant vessels sunk and damaged is almost double that of the previous year.

Over 8,000 anti-shipping sorties were flown by the Command since D Day and its antishipping squadrons played a vital part in disrupting the enemy's sea communications. Once our forces were firmly established in Northern Europe and the principal ports were either occu-pied or neutralized, the "Strike" wings turned again to enemy shipping off the Dutch and Norwegian coasts. By use of the strongest forces of Mosquitos and Beaufighters ever employed against Nazi convoys, not only were German defences pounded, but the Command's own losses were remarkably low. Meanwhile the liberation of Belgium has provided a useful new base for Coastal Command aircraft.

Towards the end of the year the main battle was being fought off the Norwegian coast, Mosquitos and Beaufighters penetrating into the most heavily defended fiords and anchorages. Flare-dropping Halifaxes were used to check

the movement of enemy convoys by night.

Throughout the year the Leigh Light was again of great value to the Command in its operations at sea, and weapons used included the 6-pdr. cannon in Mosquitos and the rockets fired by Beaufighters and Mosquitos.

The Photographic Reconnaissance group of Coastal Command played an outstanding part in the battle against the flying bomb, enabling both British and Americans to "target" the launching sites, while the "Met Flights" continued to aid all British and Allied forces operating from the U.K. The Air-Sea Rescue Service has carried out many fine rescues.

THE MEDITERRANEAN THEATRE

In the Mediterranean area, no less than elsewhere, expanding air power has had a decisive influence on operations. By the beginning of the year the Mediterranean Allied Air Force had built up substantial forces in Southern Italy and in Corsica and Sardinia, and was in a position to exercise the strongest pressure on the enemy over Southern Europe generally. Especially good work was done by the United States heavy bombers, which were a vital part of the striking force.

The Desert Air Force, in which the South African Air Force is well represented, constantly harried the German armies retreating north of Rome. In under a month about 10,000 motor transport vehicles were wrecked and of these many fell to the Kittyhawks and Mustangs, which in one day destroyed a complete convoy of over 200.

Along the Danube enemy traffic was impeded —and for long periods suspended altogether by the mining of the river, in which R.A.F. Wellingtons and Liberators laid hundreds of mines, with the result that more than sixty tugs and 200 barges were sunk. Wellingtons again carried much of the supplies sent to Marshal Tito, as well as bombs for Balkan

The ejection of the Germans from Greece. and their flight through the Balkans, were largely due to the support to our armies given by R.A.F. Spitfires, which had also provided cover for the operations in the South of France during August. In addition, however, to their offensive role, the R.A.F. Balkan Air Force, established in 1944 to support Marshal Tito's and other operations, organized succour for the Partisan sick and wounded on an extensive scale, these missions in unarmed Dakotas calling for the highest skill and courage in the crews. From Yugoslavia alone over 1,300 people were evacuated during June to November, while on 22nd August nearly 1,000 wounded were brought to Italy by British and American Dakotas in a single day. All the time the Coastal Air Force has thrown its protection over our ports and convoys, and maintained its ceaseless war on enemy shipping.

Up to the end of the year some 218,000 sorties had been flown by R.A.F. and Dominion units in the M.A.A.F. and the Middle East. Nearly 400 ships were beached or sunk through air attack, with a further 240 probably sunk and over 700 badly damaged.

SOUTH-EAST ASIA COMMAND

The Allied Air Forces have complete supremacy in Burma and the three campaigns fought there in 1944 all led to Japanese defeats. The first victory was in Arakan last February, when encircled troops of the 15th Indian Corps and 7th Indian Division Headquarters were cut off. Thanks to ammunition, food, petrol and medical supplies dropped by air, they were enabled to stand fast until the rest of the 15th Corps could deal with the enemy. Here was a turning point in Far East warfare.

A month later three Japanese divisions crossed the Chindwin, approached Imphal, almost captured Kohima, and cut the main supply road from Dimapur. But while the beleaguered garrisons held out, two entire divisions were flown to the Imphal Plain from Arakan, and the defenders were supplied by air. In May, the Allies counter-attacked, outflanked thousands of the enemy, and began the long march which has now brought us across the Chindwin.

The third victory was in North Burma, when Wingate's Chindits were flown in behind the enemy forces to disrupt their vital supply line to the north. Myitkyina fell after a siege of seventy-seven days and immediately transport aircraft brought in reinforcements and supplies. The fruits of this victory are still being reaped in the twin drives which in December had reached Bhamo and Katha.

The scanty communications in Burma demonstrate the supreme value of air power. Because of Allied air superiority, enemy road, rail and water traffic is never out of danger, and in consequence Japanese troops often go hungry and ill-clad. Their fighting-line, moreover, is under ceaseless air attack.

As well as making repeated visits to Rangoon, Moulmain and other communication centres in Burma, British and American Liberators of the Strategic Air Force have bombed targets on the French Indo-China coast, often making round trips of more than 2,000 miles. Meanwhile, transport aircraft have flown in all weathers over "the Hump" to take supplies to China, and Catalinas and Sunderlands have come vast distances across the sea to hunt U-boats and guard our convovs.

THE TRAFFIC OF TRANSPORT COMMAND

R.A.F. Transport Command—the youngest in the Service—expanded greatly in 1944. It ferried thousands of aircraft across the Atlantic to the U.K. and North Africa, and delivered others from this country to the Middle and Far East, as well as spares, supplies, aircrews, key personnel, medical requirements and mails over more than 80,000 miles of scheduled air routes throughout the world.

In the liberation of Europe, Transport Command had a special function, and a close-support Group was formed for this purpose. After first dropping leaflets in the landing area, the Command towed gliders filled with airborne troops a few hours before the first sea-borne landings. Later, the Command took to Normandy several R.A.F. Wings, comprising some 2,000 men, and many tons of supplies. From D Day to the end of the year some 15,000 tons of supplies were flown to the Continent and more than 50,000 casualties have been flown home.

When the rapid Allied advance in Normandy threatened to outpace truck-borne supplies, a stream of R.A.F. Dakotas, with others of the U.S. Troop Carrier Command, began a shuttle service which, in the quantity of material transported in the time, surpassed any operation previously attempted. The Command's aircraft were again in the spearhead at Arnhem, flying through heavy flak with the gliders.

DEVELOPMENTS IN FLYING AND TECHNICAL TRAINING COMMANDS

The year 1944 saw both rapid technical progress and great changes in operational requirements, among them the air training of the Army Glider Pilot Regiment.

Three Empire schools of Flying, Navigation and Armament have been established. Meanwhile, training in the use of Radar and similar

equipment was greatly developed.

Of special importance after D Day was the establishment just beforehand of the first R.A.F. Casualty Clearing Hospital in this country, to which wounded from the Continent are flown almost every day.

DOMINIONS AND ALLIES

This review of activities in 1944 is specifically an outline of the work of the Royal Air Force. That work, however, should be set in its true background, for the air war has been prosecuted by the R.A.F. in company with squadrons and personnel from the Royal Air Forces of Canada, Australia and New Zealand; from South Africa, Rhodesia and other parts of the

British Commonwealth and Empire; by squadrons and men from Allied countries which are also fighting in the common cause, among them the French, the Poles, Norwegians, Czechs, Belgians and Dutch.

AIRCRAFT CASUALTIES—OCTOBER TO DECEMBER, 1944

	(Over Europe*†	Over G.B.	M.E.	Italy.	S.E. Asio.	Totals.
Enemy aircraft destroyed: October	•••	26	6	7	70	31	140
November		40	2	0	50	7	9 9
December		68	0	0	89	7	164
Total for Quarter	•••	134	8	7	209	45	403
R.A.F. and Allied: October	•••	146	0	3	320	26	495
November		155	0 .	2	316	18	491
December		153	0	0	346	24	523
Total for Quarter	•••	454	0	5	982	68	1,509
AIRCRAFT CA	ASU	ALTIES	FOR YE	AR 19	44		
Enemy aircraft destroyed: 1st Quarter		185	144	39	1,039	160	1,567
2nd Quarter		174	81	10	1,500	103	1,862
3rd Quarter		67	8	19	992	16	1,102
4th Quarter		134	8	7	209	45	403
Year	•••	560	241	75	3,740	324	4,934
R.A.F. and Allied: 1st Quarter		981	0	46	436	74	1,537
2.10		82 8	1	31	1,044	71	1,975
3rd Quarter	•••	579	0	17	1,201	53	1,850
4th Quarter	• • •	454	0	5	982	68	1,509
Year		2,842	1	99	3,663	266	6,871

^{*} Excludes U.S. claims and losses.

[†] Excludes Normandy campaign and all operations connected with the campaign in Europe.



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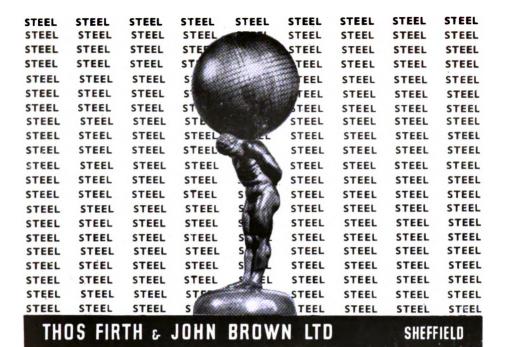
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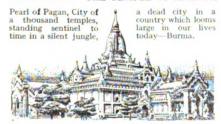
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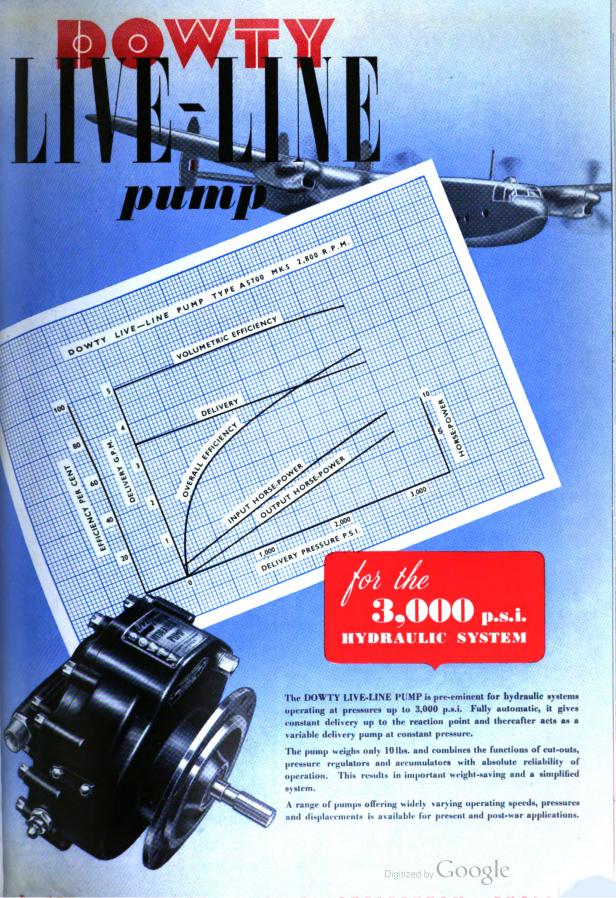
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THE ROYAL AIR FORCE QUARTERLY

Embodying also the Royal Australian Air Force, Royal Canadian Air Force, Royal New Zealand Air Force, and South African Air Force

EDITOR:

WING COMMANDER C. G. BURGE, O.B.E., q.s., R.A.F. (Retd.)

Assisted by an Advisory Committee of Members of the R.A.F. and Air Forces of the Dominions

VOLUME XVI

JUNE, 1945

NUMBER 3

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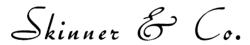
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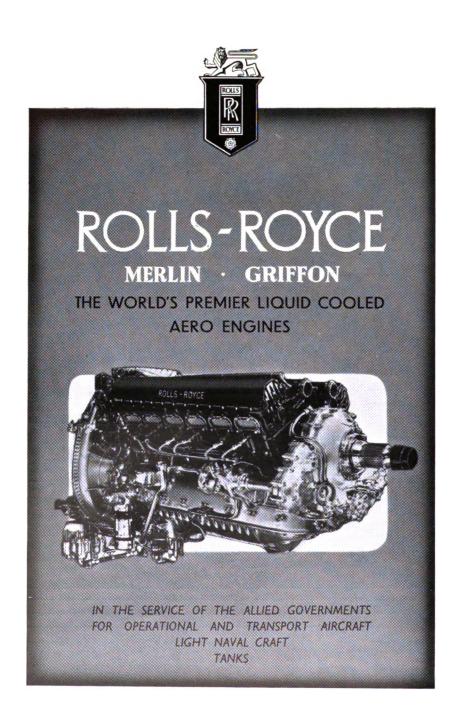
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NOTICES

St. John & Red Cross Emergency Help Committee

The Editor,
THE ROYAL AIR FORCE QUARTERLY.

21st April, 1945.

DEAR SIR.

As Chairman of the St. John and Red Cross Emergency Help Committee, which exists to assist ex-Service men and women who may be in distress on account of sickness or wounds resulting from their service, I am writing to you to request your help in making the Committee's work known.

. . . I would like to make clear that the object is not to encourage financial support, since ample funds are provided by the Joint Committee of St. John and British Red Cross Society, nor even to obtain background publicity by editorial means for such assistance. The Committee is simply anxious that the existence and nature of its work shall become more widely known to all Service and ex-Service people and to those interested in, and connected with them, so that all who are eligible for, and in need of, help may be aware that it is readily available and how they can obtain it. . . .

Yours faithfully,

R. BROOKE-POPHAM,

Chairman.

What would you do if you were disabled with a 30 per cent. pension and a good job—and your health broke down? It might happen and it might happen to you.

One of these days you will be ex-Service men. Some of you during the period of your Service life may contract ill-health, incur a bad physical accident or be wounded in action, and you will be discharged from the R.A.F. as disabled. It is for disabled ex-Service men and women that the Emergency Help Scheme of the Joint Committee of the Order of St. John and the British Red Cross Society exists and functions, and it is because one day you may be disabled and need help in an emergency that information about their scheme is given in this Journal.

Originally, the scheme came into being in 1920 "in order to assist, sick and disabled men who are in distress in consequence of the war," and up to the end of 1943 more than £1,600,000 had been spent to this end on 1914-18 ex-Service men. In 1940 the plan was extended to include help for the men and women disabled and discharged from Service life in this war, provided their applications for help conform to the four general qualifications under which the scheme is administered:—

- (a) The need must be connected with disabilities.
- (b) The applicant must have served either in the war of 1914-18 or in the war of 1939-4—:
- (c) There must be a definite end in view;
- (d) The proposed assistance must not be primarily within the scope of some other Voluntary Fund or of a Public Authority. (The Public Authority concerned is usually the Ministry of Pensions; other Voluntary Funds recognize the Emergency Help Scheme as the proper one to deal with disability pensioners or men and women awaiting decision on pension claims which are deemed likely to succeed.)

If the applicant fulfils these four basic conditions the Emergency Help Scheme can operate on his or her behalf in a variety of ways. Financially, it can help during emergency periods with recoverable advances against possible award, or renewed or increased awards, by the Ministry of Pensions. The Scheme also provides maintenance allowances for men who suffer a temporary breakdown due to their disability with a resulting loss of earning power, and will pay furniture removals, travelling expenses and other items.

The Scheme lends a helping hand in all kinds of emergency situations—dental treatment, convalescence, clothing, invalid diet, surgical and sick-room appliances.

One particularly useful service to limbless men—for which there is a special fund—is the provision of motor units for invalid chairs which are supplied by the Ministry of Pensions. War-time restrictions have for the time being, unfortunately, limited the issue of these



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motors to men who either would suffer in health from hand-propelling the chairs, or who need them for journeying to their work.

The Scheme also provides business equipment or stock for those within its scope who want to start a business of their own, but operates only in those cases where the disability prevents the applicant from taking advantage of any existing Government training or rehabilitation scheme.

The most important aspect of the Emergency Help Scheme is that it lives up to its name—that help in an emergency is always given to the deserving, however great or small that help may be. Sometimes a train fare from London to Cardiff will make just the difference to a man's existence, sometimes it is a question of supplying him with two warm blankets or of giving him the advice of experts on his postwar plans for a new business in a new town or of getting him fit to go back to his old job in his home town.

The Scheme specializes in help to the Disability Pensioner, or to the man and woman who is awaiting the decision of the Ministry of Pensions, and does not overlap with the other Ex-Service Funds.

This, briefly, is the work of the Emergency Help Scheme. There is an E.H.S. representative in every county of England and Wales, and a main office in Northern Ireland and Eire. Application should be made to the appropriate County Representative, or to Headquarters, Emergency Help Committee, 12, Grosvenor Crescent, London, S.W.1. They are there ready and waiting to help you in case the need arises.

Rest Home for W.A.A.F.

Sixteenth-century Studley Priory, near Oxford, has recently been taken over by Technical Training Command of the Royal Air Force for use as a rest home for W.A.A.F. "other ranks" who are suffering from war strain and fatigue.

The Priory, which is in the heart of the country, has spacious grounds and large rooms.

Games, gardening, keep-fit classes, sewing and embroidery, whist drives, supper dances and country walks combine to make the girls forget their arduous war jobs.

The girls are from all trades—plotters,

drivers, cooks, waitresses and clerks.

Flight Officer E. Finlay, who is in charge of the home, lives at Monkseaton, near Newcastleon Tyne.

R.A.F. University Scholarships

£29,367 SUBSCRIBED BY TECHNICAL TRAINING
COMMAND

Sons and daughters of officers, airmen and airwomen who have fallen on active service, or served in the R.A.F. or W.A.A.F. in the present war, are eligible, through the generosity of R.A.F. Technical Training Command, for scholarships providing advanced training at a University.

The sum of £29,367 has been subscribed by Command Headquarters, Group Headquarters and stations of Technical Training Command, under the command of Air Marshal Sir Arthur Barratt, K.C.B., C.M.G., M.C., for this purpose.

The scholarships are valued at £500 each and are payable at the rate of £100 per annum for five years to the selected beneficiaries. They will be named after the R.A.F. Groups or Stations contributing, and will be known as the Technical Training Command Scholarships.

The Grants Committee of the R.A.F. Benevolent Fund will be responsible for the award of the scholarships, and full details are available from the Head Offices of the R.A.F. Benevolent Fund at their temporary address, 14, Eaton Road, Hove, Sussex.

Award of the Victoria Cross

THE King has been graciously pleased to confer the award of the Victoria Cross on the undermentioned officer in respect of most conspicuous bravery.

CAPT. EDWIN SWALES, D.F.C. (6101V), S.A.A.F., 582 Squadron (deceased)

Capt. Swales was "master bomber" of a force of aircraft which attacked Pforzheim on the night of 23rd February, 1945. As "master bomber," he had the task of locating the target area with precision and of giving aiming instructions to the main force of bombers following in his wake.

Soon after he had reached the target area he was engaged by an enemy fighter and one of his engines was put out of action. His rear guns failed. His crippled aircraft was an easy prey to further attacks. Unperturbed, he carried on with his allotted task; clearly and precisely he issued aiming instructions to the main force. Meanwhile the enemy fighter closed the range and fired again. A second engine of Capt. Swales's aircraft was put out of action.

Almost defenceless, he stayed over the target area issuing his aiming instructions until he was satisfied that the attack had achieved its purpose.

It is now known that the attack was one of the most concentrated and successful of the

war.

Capt. Swales did not, however, regard his mission as completed. His aircraft was damaged. Its speed had been so much reduced that it could only with difficulty be kept in the air. The blind-flying instruments were no longer working. Determined at all costs to prevent his aircraft and crew from falling into enemy hands he set course for home. After an hour he flew into thin-layered cloud. He kept his course by skilful flying between the layers, but later heavy cloud and turbulent air conditions were met. The aircraft, by now over friendly territory, became more and more difficult to control; it was losing height steadily. Realizing that the situation was desperate Capt. Swales ordered his crew to bale out. Time was very short and it required all his exertions to keep the aircraft steady while each of his crew moved in turn to the escape hatch and parachuted to safety. Hardly had the last crew-member jumped when the aircraft plunged to earth. Capt. Swales was found dead at the controls.

Intrepid in the attack, courageous in the face of danger, he did his duty to the last, giving his life that his comrades might live.

CAPT. EDWIN SWALES, V.C.

Capt. Edwin Swales was always proud of his association with the Pathfinder Force of Bomber Command and of the fact that he was the only member of the South African Air Force to have flown with them.

On the outbreak of war he left the bank in which he was working at Durban to join the South African Army. When the chance came, he left the Army to become, what he always wanted to be, a pilot. He soon proved to be highly skilled and reliable. He came to England and, in June, 1944, he was given the opportunity of joining the Pathfinder Force.

He was in the attack on a railway yard at Cologne when the master-bomber, Capt. Swales's friend, Squadron Leader R. Palmer, won the V.C. There was intense opposition and for his own part in the attack he received the immediate award of the D.F.C. His aircraft was attacked by a fighter, which was shot down. In another attack, made last year in daylight over Germany, his Lancaster was badly damaged by flak. He struggled on until

he knew that he had reached the Allied lines, where he made a skilful crash landing. By the evening of that day he was back in his squadron mess and ready for the next day's operation.

His great qualities of leadership were recognized by the whole squadron. "He was ideally suited to be a master bomber," said one of his many friends. "He was always cool as well as daring." The attack on Pforzheim on 23rd February, 1945, in which he won the V.C., was one of the most destructive ever carried out by Bomber Command. This was directly due to his control of the bombing. It was a small target and any error of judgment would have put the bombs outside it.

"His crew worshipped him. He had only to smile and they were with him all the way."

"But for Ted we should not be here now," said one of his crew.

ELEGY

Blow softly, zephyrs, o'er this place—here lies One who has conquered you, whose glancing wings

Had roved the gustiest alleys of your skies— Who loved your kiss, nor feared your buffetings.

Fan lightly now, that he may dream again
Of morning, and recall the wind's cold sweep
Upon him, as he ran to meet his 'plane . . .
But not so rude to wake, who dreams so

deep.

Spring gaily, flowers, to liven his last peace, Unchecked in glowing colour or in mass; He never curbed his generosities— Run riot, then, above this Lycidas,

Let the bright arches of your rainbow start
From every crevice of his simple tomb,
Spring sweetly from his brain, his eager heart,
And from his valiant soul exhale perfume.

Look long, O passer-by, on this quiet grave,
Reflect how much of you lies buried here—
What loves you cherish now, he died to save,
What fruits you yet will taste, that he bought

Think how for England this brief candle burned,
Spilling its radiance in her changing sky,
Bless his rich earth to English earth returned—
And let your children learn how some men

M. W. J.



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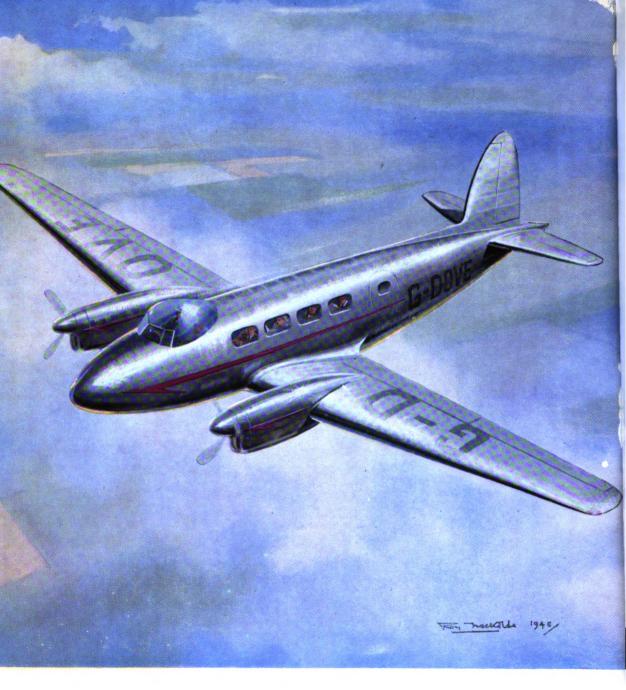
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AIR CHIEF MARSHAL SIR CHARLES S. BURNETT

Whose death recently . . . "leaves one more vacant place in the ranks of the old squadron whose members have fought with and for the Air Force for a generation or more."



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AIR MARSHAL SIR PETER R. M. DRUMMOND, K.C.B., D.S.O., O.B.E., M.C.

(See page 123)

SUBJECTS FOR ROYAL AIR FORCE OUARTERLY

£125 PRIZE ESSAY COMPETITION

OPEN TO ALL RANKS OF THE R.A.F., R.C.A.F., R.A.A.F., R.N.Z.A.F., I.A.F., AND THOSE OF THE ALLIED AIR FORCES SERVING WITH THE R.A.F.

INTRODUCTION

THAPTER VIII of the Dumbarton Oaks Charter sets out various methods to be employed to deal with a potential or actual breach of international peace. Under these arrangements certain quotas of national forces are to be made available in order that the military sanctions may be applied if necessary. In particular, so as to enable urgent military measures to be taken, there are to be held immediately available national Air Force contingents for combined international enforcement action. If these international air contingents are to function effectively, the Governments concerned must arrange in normal times for such co-operation as will enable the contingents to act speedily and adequately should an international crisis arise.

The substantial community of sentiment in the field of training, in the field of operations, and in the general comradeship between the Dominion Air Forces and our own, existing long before the war, has been strengthened and substantially enlarged during the war to the extent almost of creating a unified Common-

wealth and Empire Air Force.

In addition, in this war, there has been built up in this country an International Air Force comprising the Royal Air Force and the Air Forces of our Allies—Norwegian, Dutch, French, Belgians, Poles and Czechs. The community of sentiment in all the essential factors making for close co-operation, comradeship and swift action, exists between these forces and our great American ally, whose organization and ours are practically the same to-day.

Subject No. 1

The Commonwealth and Empire Air Forces and Allied Air units at present serving with the Royal Air Force are fully integrated with the latter. They are organized, trained and operated on an almost identical basis. How far can this close integration in its present form be made a common object of our policy and contribute to the carrying out of projects for securing peace?

SUBJECT No. 2

Mobility is an essential element in the defence of the widespread commitments of the British Commonwealth of Nations and Empire, and for combined international enforcement action. Discuss the part that air forces might

play in these spheres and the effect that the proposals might have on the existing responsibilities of the three Services.

SUBJECT No. 3.

Discuss the effects that the rocket (including all rocket-propelled projectiles) and pilotless aircraft are likely to have on warfare generally and the extent to which they are likely to affect the defence of the British Commonwealth and Empire and the international air contingents envisaged above.

CONDITIONS OF COMPETITION

The competition is open to all ranks serving in the Royal Air Force, including members of the Allied Air Forces serving therewith, and the Air Forces of the Dominions.

Length of Essays. Each competitor is required to write an essay on only one of the above subjects of his own choosing. He may, however, enter an essay on each subject if he so desires.

Each essay must not exced 8,000 words.

ALLOCATION OF PRIZES

1st Prize.—For the best essay in all three subjects, £40.

2nd, 3rd and 4th Prizes.—For the next best essay in each subject, three prizes each of £20.

Other Prizes of a Total Value of £25.— These will be awarded to any other essays which the adjudicating committee consider are deserving of an award.

ADJUDICATING COMMITTEE

The adjudicating committee will consist of three serving officers of Air rank.

RULES FOR SUBMITTING ESSAYS

Essays must be sent by registered post. No name or other indication of who the author of the essay is must appear on the essays, which should be placed in a sealed envelope marked "R.A.F. QUARTERLY Prize Essay Competition" and inserted in another envelope addressed to The Editor, R.A.F. Quarterly.

The name and address of the competitor is to be inserted in a small sealed envelope attached to the inner envelope containing the two copies of the essay. These envelopes containing competitors' names will not be opened until the essays have been adjudicated.

Essays should be typed, but if this presents any difficulty they can be submitted in hand-script providing this is legible. Closing date, 31st December, 1945.

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TO US THE VICTORY 1939—1945

The drums like muffled anger and the trumpets can be heard!

The air is harsh with clangour as the nations are bestirred,

For the God of Battles heard us when we pledged our slender powers,

And He gave us strength to gird us, and the fruits of war are ours!

The mills of war have ground us, and have ground exceeding small, Yet the victor's wreath has crowned us, and the crowning us is all; The battlefield's still dusty and the fallen not yet cold, But our throats ring loud and lusty with the story to be told!

From the valleys, from the highlands, from the sunlands and the north, From the plains, the small lost islands, from the forests, came we forth; We left the ripe corn waving when the far-off bugle pealed, We left the heifer calving, and the new lamb in the field.

We bade adieu our dearest ones, and to the past, adieu—
The darkling hour before the guns was all the time we knew;
We had Righteous! for our banner, and On! for battle cry;
Our hearts were fired with honour, and we kept the fuel high.

Now the enemy is broken and his blood flows to the stream.

Our heroes lie, unwoken, their faces pale with dream—

They lie like trodden flowers with their faces to the east.

Wilt count their rarest hours. Lord, who reckoned them the least?

This noon must lose its glory, but their light shall never fade—Not the bitter, burning story of the Mightiest Crusade. Our oriflamme shall carry, above the victrix spear, The words we say with Harry—O God, Thy arm was here.

WRENNE JARMAN.



Empire Air Co-operation*

A BROADCAST BY AIR MARSHAL SIR PETER DRUMMOND, K.C.B., D.S.O. and Bar, M.C.

A IR MARSHAL SIR PETER DRUM-MOND, K.C.B., D.S.O. and Bar, M.C., up to the time of his death had been Air Member for training since April, 1943. When war broke out he was senior air staff officer, Middle East, and he remained at that Command, becoming deputy air officer Commanding-in-Chief in 1941, until the enemy was finally defeated in North Africa.

Air Marshal Drummond, an Australian, began his service career as a private in the Australian Army Medical Corps in 1914 and was commissioned in the Royal Flying Corps in 1916. He was awarded the D.S.O. and Bar and M.C. in the last war.

He was in command of the expedition to South-Eastern Sudan in 1920, and was commended by the Air Council for his services.

He graduated at the Royal Air Force Staff College in 1922 and was seconded for two years for duty with the Royal Australian Air Force in 1927. After a course at the Imperial Defence College in 1929 he commanded R.A.F. Station, Tangmere, subsequently being posted to the Air Ministry for air staff duties before taking command of No. 11 (Fighter) Group in 1936.

Air Marshal Drummond was born at Perth, Western Australia in June, 1894, and was educated in Australia. He was awarded the O.B.E. in 1921, the C.B. (Military) in 1941, and the K.C.B. in 1943.

Air Marshal Drummond told listeners in a recent broadcast how the ideal of air co-operation between different parts of the Empire—which he advocated at the Imperial Conference in 1923—has since been developed. "The institution of the Empire Air Training Scheme in 1939 was a natural . . . outcome of the growth of this spirit," he said, and, in his talk, he made a strong plea for Empire Air Co-operation.

Every day on the way to my office in Kingsway, London, I make a point of passing the Boomerang Club at Australia House—just for the pleasure and self-gratification of exchanging a salute and a "good-day" with some of the best air crew in the world—the R.A.A.F.

It gives me a very satisfied feeling—though it is a bit homesick-making—because I was

born and brought up by the sea beaches at Cottesloe, a few miles from Perth, and when I left there in 1914 with the First Australian Expeditionary Force I did not expect to be away for so long.

It is a little over twenty-eight years ago since I first arrived in England, one of a shipload of Australian casualties from Gallipoli. Six months later, complete with one "pip" on my shoulder and a brand-new pair of pilot's wings on my tunic, I was on my way back to the Middle East to fly for nearly two years with No. 1 Squadron of the Royal Australian Flying Corps, the forerunner of the Royal Australian Air Force of to-day.

FAMOUS NAMES IN AVIATION HISTORY

Before that war ended, No. 1 Squadron of the R.A.F.C. was to make a great name for itself, and, incidentally, to breed some of the famous airmen—Sir Ross Smith, my great friend and companion on many operational flights; Air Marshal Williams, for many years Chief of the Australian Air Staff; Air Vice-Marshal MacNamara, V.C., Air Vice-Marshal Cole, Murray-Jones, Hudson-Fysh, Mustard, and many others.

When the Royal Air Force settled down to its permanent peace strength in 1919 there were, perhaps, twenty Australians who, like myself, had been released from the A.I.F. and were serving with the R.A.F. To-day, twenty-five years later, there are over twenty thousand Australian air crew serving with the Royal Air Force on this side of the world, both in Royal Australian Air Force and R.A.F. squadrons.

This is a fact of the very greatest significance to Australia, to the United Kingdom and to the Empire and, in some small way, it is related to the chance occurrence that fifteen to twenty Australians elected to make their career with the Royal Air Force at its inception.

At this time of the year, after several consecutive days of frost and fog in London, I often wonder why I was so unwise as to abandon my native Western Australia, where I could at least keep decently warm at Christmas time. However, having taken the decision to join the R.A.F., I have made it a first interest over the past twenty-five years to preach continually the doctrine of air force co-operation with the Dominions and, particularly, with Australia and New Zealand.

^{*}Reproduced from "London Calling," No. 288

VITAL TO OUR COMMON SECURITY

I am convinced that the air forces and airmen of the British Commonwealth of Nations must be brought up in the same school of air thought, following a common doctrine, and speaking a common language of the air. It is not only vital to our common security as at present, but it is of the utmost importance to our future well-being and hope for a long and unbroken period of peace and social development. And this co-operation must be planned. It is not by *chance* that to-day there are tens of thousands of airmen drawn from the United Kingdom, Australia, New Zealand, Canada, South Africa, Rhodesia, India and the Colonies fighting side by side, trained in the same aircrew schools and imbued with the same traditions.

For this reason it seems to me urgent that every possible measure should be taken to nourish and expand the intimate co-operation and good will built up in this war between the air forces of the Dominions and the Mother Country.

In 1923 I was serving as a very junior officer on the staff of the Chief of the Air Staff—then Lord Trenchard, the "Father of the Royal Air Force." He rang for me one day and said: "I am going to give the assembled Prime Ministers of the Dominions a talk on the air menace to the British Empire. Get together the necessary maps and papers for this talk, and put up any suggestions you may have for co-operation with the Dominions in connection with this problem."

I sat in on this conference. Australia was represented by Mr. Stanley Bruce, who was then the Empire's youngest Prime Minister; New Zealand was represented by Mr. Massey, I think the oldest Prime Minister; and South Africa was represented by General Smuts, who still reigns, and who, when I last met him some eighteen months ago, quoted some of the things Lord Trenchard had said at that same conference.

One important decision made at the 1923 Imperial Conference—and as it was my own suggestion it pleased me greatly—was that the Royal Air Force and the Royal Australian Air Force should exchange officers. I took care to ensure that I was selected as the first Royal Air Force officer for this duty. In this way I came to be appointed Deputy Chief of the Air Staff under Air Marshal Williams at the Air Board in Melbourne.

During the four years I held that post we were able to take many small steps forward

along the path of Dominion air co-operation. We were able to persuade our reluctant Treasury Departments to provide the necessary funds to enable fifty Royal Australian Air Force trained pilots per annum to go over to England for five years' service with the Royal Air Force. I myself interviewed nearly two thousand applicants all over Australia for the first fifty vacancies, and it is not surprising that some of those selected stayed on in the Royal Air Force after their five years were up, and the majority of these have made great names for themselves in this war. To mention only one, Group Captain Hughie Edwards, V.C., D.S.O., D.F.C.

ENCOURAGING GROWTH OF CO-OPERATIVE SPIRIT

During those years I also spent much effort in persuading schools to encourage boys to try for cadetships at the Royal Air Force College, Cranwell. I was pleased that the first selection was a boy from my own State, E. C. Huddlestone, who passed out of Cranwell with the Sword of Honour and has had a distinguished Service career ever since. Just recently he was awarded the C.B. and promoted to Air Vice-Marshal (the youngest in the Air Force) to command one of the Operational Groups now in France.

In these and many other small ways it was possible to encourage the growth of the spirit of Commonwealth Air Force Co-operation. The institution of the Empire Air Training Scheme in 1939 was a natural and proper outcome of the growth of this spirit. To-day I am member of the Air Council responsible for all the training of the Royal Air Force. The field for effort is wider, but the future has many complex problems that must be solved.

The Empire Training Scheme is about to be formally wound up. It has served its primary purpose—producing many thousands of air crew trained in the same methods and to the same high standards necessary to ensure our complete air superiority over the enemy. But the formal termination of the Empire Training Scheme will not, I hope, mean that the Royal Air Force will cease to train air crew in training schools in the Dominions; nor that Dominion air crew will cease to train at Royal Air Force schools, especially the Central Schools and Colleges, where the agreed principles of air warfare, based on our united experience, can be formulated.

In 1942 the Commonwealth Air Forces agreed to the establishment in the United Kingdom of the Empire Central Flying School.

This school is staffed by experts in pilottraining from all over the Empire. The students who attend it are senior instructors nominated by the Dominions and the R.A.F., and here they bring together their varied experiences and discuss the problems involved in the science of flying-training. It is intended that this school, in which all the Air Forces of the Dominions have a share, should become the foremost university of research into the science of pilot instruction, so that graduates may return to their various spheres with a common agreed doctrine.

More recently we have established, on the same lines and with exactly the same aim in view, the Empire Central Armament School and the Empire Central Navigation School. Only a few months ago, a team from the Empire Central Navigation School visited Australia and New Zealand in one of the School's Lancaster aircraft equipped with all the very latest instruments for air navigation. During their round-the-world flight, which lasted only fifty-three days, the team in this aircraft demonstrated methods and equipment to many thousands of interested airmen. Incidentally, they flew back to the United Kingdom from Australia in seventy-two hours. This fast flight was not done for any particular purpose, but it does serve to indicate the shape of things to come, and the future possibilities for inter-Dominion Air Force co-operation in training and development.*

It is obvious that in the quite near future there is every reason why it should be an every-day normal occurrence for squadrons and aircraft of the Royal Air Force and squadrons and aircraft of the Dominions to carry out inter-Empire training flights and air exercises

As I see it, we should aim in the post-war period to keep in being, at any rate, the principles of the British Commonwealth Air Training Plan. I should like to see at least one Flying Training School in each Dominion

devoted to the training of its own airmen and Royal Air Force personnel.

We should aim to ensure a constant interchange of personnel to enable lasting contacts to be made, and this interchange should cover not only air crew but all ranks, trades and branches. We should also aim at ensuring a frequent interchange of formed units complete.

People will tell you that there is no "black art" about flying. It is true that the majority of healthy young men and women, and even decrepit old Air Marshals of fifty, can be successfully taught to take off and land an aircraft such as the de Havilland Moth. In the old days of No. 1 Squadron of the Royal Australian Flying Corps, we thought ourselves pretty terrific as we pottered about the Palestine sky at perhaps 120 miles an hour, with a bomb load of four or five hundred pounds.

But times have changed and our efforts of those days would hardly be dignified with the name of operational flying by comparison with the job of the pilot of to-day roaring over Germany with his load of 12,000-pdr. bombs at 300 miles an hour. To-day there is only a small proportion of the total population which is physically and mentally capable of operating successfully the modern Service-type aircraft. Of these, only a still smaller proportion is able and willing to learn to fly a modern four-engined bomber and, what is more, deliver its bomb load with deliberation and precision upon a well-defended target in Germany.

The prowess and proficiency, the bravery and determination of the Australian and New Zealand airmen in this war are matters of common knowledge within the Royal Air Force. They must be matters for great pride and satisfaction to Australia and New Zealand. So it happens that to-day, when the Londoner meets a member of an air crew in the dark blue uniform of the Royal Australian Air Force, he sees not only a first-rate airman, and perhaps the best advertisement that has yet happened in this country, but also he sees a good omen for the future of our British Commonwealth of Nations.—(Broadcast in the B.B.C.'s Pacific Service.)

In the Press.—"Window to a Fuller Life." Price 2s. 6d. net. Copies obtainable from the Editor, R.A.F. QUARTERLY.

^{*}See article "Lancaster Round the World" in this number of the R.A.F. QUARTERLY.

The War in the Air—1939-45

SEPTEMBER, 1939—FEBRUARY, 1940

N the first six months of war the Royal Air Force did not operate at full intensity. Rather it was a period in which we were developing and consolidating our strength in the light of the operational experience that had been gained. We were also engaged in preparing that further great expansion of strength which we knew would be required. But our pilots and our aircraft had already given a great account of themselves on numerous occasions in combat with the enemy. Already the aircraft of Bomber Command and of the British Air Forces in France had carried out by night and day over 1,000 sorties well into German territory, while our fighters in France -a great many of them in action over the Siegfried Line—had taken off more than 2,000 times for patrol, pursuit and combat.

The role of the Fighter Command had not been confined to the defence of Great Britain against attack from the air; it was extended to the coastal waters and included the protection of convoys, fishing fleets and neutral shipping near our coasts. Our fighters had amply proved their worth. Already, without a single loss on our side, they had brought down some forty German aircraft round our coasts, and many more of the enemy were known to have been forced down in neutral territory or in the sea on their return flights. Units of the Coastal Command had flown more than 5,000,000 miles on reconnaissance or convoy duty. Since the outbreak of war they had sighted submarines on more than a hundred occasions and had delivered more than sixty attacks. More than 700 convoys had been successfully escorted by aircraft of the Command. But it was over the North Sea and in hourly co-operation with the Royal Navy that the Royal Air Force had up to the present been mainly engaged. Even during the arctic weather of January—a month which provided the most severe flying weather ever known—not a day passed without finding the aircraft of the Coastal Command at their ceaseless task: sighting and bombing submarines, escorting convoys, shooting down or driving off enemy aircraft, destroying mines and accompanying leave ships safely to port.

MARCH, 1940—FEBRUARY, 1941
In the ten months ending in February, 1941,

in two theatres of war, the Royal Air Force fought against very great odds, but not without success—as the destruction mainly by our incomparable fighter squadrons of some 4,250 German and 1,100 Italian aircraft with a loss in combat of fewer than 1.800 aircraft of our own, the security of our shores and the part played by the Royal Air Force in the disruption of the Italian Empire, combine to testify. The part played by the Royal Air Force in breaking up the Italian Air Force is well illustrated by the battle which took place on 9th March, 1941, in Albania, which is typical of many other battles which took place in the air over that country, when fifteen of our Gladiators engaged fifteen G.50's—one of the best Italian fighters—fifteen C.R. 42's and fifteen Savoia 79 bombers and B.R.20 bombers over Klissura. Our fifteen Gladiators—which were not the most modern of our fighters—destroyed six G. 50's and one B.R. 20, and probably destroyed one G. 50 and one B.R. 20; that is to say, they destroyed seven and probably two others for a loss of one Gladiator, the pilot of which baled out and descended safely in our

Our bombers made 260 raids on aerodromes and seaplane bases, 300 upon docks and shipping, 470 on railways and communications, and 630 on industrial targets, all of these in Germany, apart from their raids on German-occupied territory. In addition, very many heavy raids were made on those objectives like the invasion ports and others in territories then occupied by the Germans. Aircraft of Coastal Command, with all their varied activities of reconnaissance across the sea, convoy, patrol, attacking warships, U-boats and merchant vessels, and photographing and bombing enemy bases, in ten months flew 16,000,000 miles.

The air war was not being fought on our side by the squadrons of the Royal Air Force and the Fleet Air Arm alone. The squadrons of Canada, South Africa, Australia, New Zealand and the Rhodesias, squadrons manned by men from India and Newfoundland and from all the Colonial Empire, were playing their part in the battle. Day by day, in the Middle East and at home, the achievements of these squadrons redounded to the honour of their own lands and of the Empire. Moreover, a great and increasing element in our strength was contributed by the Air Forces of our Allies, the

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squadrons of Poland, Czechoslovakia, Holland, and of the Free French, Belgian and Norwegian airmen who were fighting with the Royal Air Force. There was another squadron, the Eagle Squadron, mounted on Hurricanes and manned by American pilots. The Royal Air Force welcomed these great men into its ranks. Many of the squadrons had already proved their mettle in brilliant actions against the enemy, like the famous 303 Squadron of the Polish Air Force, which in the six months ending in February, 1941, had destroyed nearly 120 enemy aircraft.

The Women's Auxiliary Air Force had proved itself an essential adjunct of the Royal Air Force. The high moral courage and the devotion to duty of these airwomen in the face of bombing attacks won the highest praise. Airwomen made an unqualified success of every trade in which they had taken the place of airmen, and the range of ground duties on which they were employed continued to increase.

The Metropolitan Air Force had secured the mastery of the skies over Britain by day, and secured it against odds greater than it was ever likely to have to face again; while its defence against the German night bomber and its attack on Germany itself had both been increasingly effective. The individual ascendancy of our pilots over those of the German Air Force—an ascendancy won in the autumn battles at heavy cost but with brilliant courage and skill-was so far maintained that their chief difficulty at this time was to bring the German pilots to battle. Meanwhile, Air Chief Marshal Longmore's squadrons had swept the Italian Air Force from the skies of Africa, while in Greece, where the Greek people by their heroic resistance to a powerful invader, had renewed the ancient glories of their race, the Royal Air Force had played their part alongside their brave Greek comrades of the air, and played it well. In Malta a tiny force, brilliantly commanded by Air Vice-Marshal Maynard, admirably supported by the Royal Navy and the Army, and especially by the anti-aircraft gunners, and by the indomitable spirit both of the Maltese and of the British population of the island, had met and broken repeated attacks by overwhelming numbers of Italians, of Germans and of Italians and Germans combined. These were sound grounds for confidence in the future -for the power of the Royal Air Force was growing and its spirit could never fail.

March, 1941—February, 1942

The operational activities of the Royal Air Force during the year were many and varied. There were three main aspects of them of par-

ticular interest. From June the main task of the Royal Air Force was to give the utmost possible help to our Russian Allies in their gigantic battle against the main German armies. To the Royal Air Force fell the privilege of fighting alongside our Russian Allies. Our squadrons acquitted themselves admirably in Murmansk. It was never the intention that these squadrons should remain in operation there during the winter months. Their function was to demonstrate the Hurricanes in action to the Russians and then to hand them over with their equipment. This successfully accomplished, and with a fine fighting record behind them as well, they were withdrawn by agreement with Marshal Stalin some time later. Increasing numbers of our aircraft were sent to the Russian front.

These, however, were not the most important ways in which the Royal Air Force had been helping Russia. Not only had our squadrons in Malta and in Africa engaged large numbers of German fighter squadrons; but also by fighter and bomber sweeps over North-Western France; by constant fighter patrol activity in the same region; by fighter and bomber attacks upon shipping in the narrow seas; and by our bomber attacks upon industrial Germany and targets of great importance to Germany in the occupied territories, we had succeeded in keeping a larger number of German fighter squadrons facing West than the Germans could spare for their Eastern front. The coal mines and factories in Belgium and Northern France, which were working perforce for the enemy, suffered severely. For five months, for example, the industrial activity of a wide area around Lille had been curtailed-for many weeks by as much as 50 per cent.—on account of damage to the power plants. Moreover, it may be recalled that during the Battle of Britain, when the enemy suffered from the disadvantage of having to fight over this country, there were very few days in which he did not sustain substantially heavier casualties than we did, while the balance over the whole period of the battle was overwhelmingly in our favour. The remarkable thing is that, although the fighting over the enemy's territory had of course been hard, our fighter squadrons managed to keep the balance of casualties in their favour. In offensive fighting from this country during these twelve months we destroyed 823 enemy fighters against the loss of 537 of our own.

The second main aspect of our operational activities during the period was our co-operation with the Navy in the Battle of the Atlantic. In combined action with the Navy, we had

virtually closed the Straits of Dover to the passage of the enemy's merchant vessels. Prior to September, 1941, an average of twenty-five enemy merchant ships of 1,000 tons or over passed through the Straits of Dover each month. During the succeeding five months, passage by merchant vessels was confined to all intents and purposes to a few fast motor vessels which contrived occasionally to slip through our patrols by night. With the French coast, French harbours, and French aerodromes in German hands, to block the Straits to enemy merchant vessels was no easy task. Its accomplishment increased German transportation difficulties in Belgium and Northern France.

Working closely with and under the operational control of the Royal Navy, in all its widespread activities from Iceland to Gibraltar, Coastal Command continued its work of reconnoitring, photographing, hunting the U-boats, protecting the convoys, sinking enemy ships and bombing ports and harbours from Trondhjem to Bordeaux. Together with the Royal Navy they drove the U-boats right out of the Western approaches. Our East Coast convoys were so well protected that between Harwich and Newhaven it is hardly an exaggeration to say that they came through with clock-like regularity.

But it is not only to Coastal Command that the Royal Navy could look for co-operation. Bomber Command, of which the entire strength was available when suitable opportunities occurred, worked untiringly on the Navy's behalf. They kept three of the most formidable warships in the German navy ignominiously confined in the harbour of Brest while the battle raged outside. They attacked the U-boats in their nests when they had come home to refit or repair; they attacked the U-boat slipways, their engine factories and accumulator factories; they laid many hundreds of mines; and during the year altogether 40 per cent. of Bomber Command's total effort was expended upon targets which the Navy had asked them to bomb.

So with Fighter Command. During the twelve months, in protective patrols over our convoys and shipping, Fighter Command flew over 50,000 sorties. The two Services worked together loyally, willingly and effectively. Both services were constantly striving to improve the methods of co-operation in the light of experience and technical developments.

The third main aspect of air operations during these months had been co-operation with the other Services in the Middle and Far East. Our Forces in the Far East had to fight under grievous shortage of air power. In spite of their extreme tactical mobility, air forces were not

strategically mobile. The maintenance crews and equipment, the petrol, bombs and ammunition had all to be moved by sea. Fighter and Bomber squadrons could not fly to the Far East from this country or from the Middle East and operate effectively on arrival without their ground staff and equipment. Nevertheless, we sent large numbers of aircraft to the Far East and took extreme risks to get them there. We lost some on the way, and we lost many in heavy fighting, but reinforcements continued to arrive in that theatre.

Our fighter, bomber and general reconnaissance squadrons there fought with splendid courage and resource against great odds and they co-operated closely and successfully with the Army. Brilliant air victories were gained by our pilots with American pilots in Burma. Those squadrons not only fought their own vitally important battle in the air, but also gave direct support to the Army, to which the General Officer Commanding the troops in Burma referred in a signal which said: "Fighter cover has been afforded continuously during the withdrawal and targets have been engaged successfully by close support bombing." In the Middle East heavy and persistent air attacks upon the ports of Libya and Tripoli, Sicily and Italy, upon the aerodromes, and upon the convoys crossing the Mediterranean, formed for many months the essential prelude to the battle and deprived General Rommel of many men and much material that he sorely needed. During the six months preceding General Auchinleck's advance the Royal Air Force and aircraft of the Fleet Air Arm sank some 175,000 tons of enemy merchant shipping in the Mediterranean. To send a ship to the bottom with fifty tanks on board was a big contribution to success in the land battle. When the battle was joined, our air superiority, which by hard bombing and fighting had been gradually acquired during the preceding weeks, was quickly asserted. It enabled our air forces to throw their whole weight into the land battle. In the words of an Army officer, "It was like France, only the other way round." The same air superiority and the same slashing attacks by our fighters and bombers upon enemy troops and vehicles supported General Auchinleck both in his advance and in his withdrawal. Remarkable evidence of the protection given by the R.A.F. to our advancing troops is that during the first three weeks of the campaign, captured German Army Intelligence summaries record only two attacks by the German and Italian Air Forces against our formations on the ground.

The pilots and crews in the Middle East

knew that their job was to do all they could to help the Army to win its battles in the Western Desert. They did not spare themselves. General Auchinleck gave them full praise. The success of the advancing 8th Army, he stated—to quote from one of the many messages received from him, in the same strain—" would never have been achieved without the wholehearted cooperation of the Air Force, whose work has been magnificent throughout."

But other unsolicited testimonials to the effectiveness of the co-operation between the Army and the R.A.F. were received. The following is an extract from the diary of a German officer: "The night was terrible, the English bombers came in force and dropped their eggs. We had no cover, not a hole nor a building, and when they had dropped their bombs they made low flying attacks and shot us up. So it goes on night after night. In broad daylight the English fighters attack our motorized columns with success."

Here, too, is an official tribute taken from a captured German Army Intelligence Summary: "On all parts of the front the enemy continues to have marked air superiority. Our own air reconnaissance has been considerably hindered."

Another German Intelligence Summary says: "The enemy continues to have air superiority and his air forces are co-operating with his land forces with great effect."

The Royal Air Force having beaten the Germans in every other form of air fighting, were consequently in a better position now to beat them at Army co-operation, and to improve the methods and efficiency of the squadrons in Army Co-operation Command. Substantial numbers of squadrons in Bomber and Fighter Commands also were being constantly practised in Army co-operation. The Army co-operation squadrons, because their primary role was to train with military formations, had been deprived for the most part of the opportunities of meeting the enemy for which they were eager. With the agreement of the Commander-in-Chief, Home Forces, these squadrons were now to be given an increased measure of reconnaissance activity over enemy territory across the Channel. The status of Army Co-operation Command was no whit inferior to that of the other three operational Commands. They would have their share of the fighting, and the tactical reconnaissance squadrons were about to be re-equipped with aircraft of a new type, described as the best of the American fighters then in full production. A new arrangement had been made to foster co-operation with the other Services from the very bottom. All pilots and air crews, trained in such great numbers overseas, spent a little time at reception centres on arrival in this country. The Admiralty and the War Office readily and cordially agreed that in future much of this time could be spent with the other Services. Each man would go to Army and naval units and would live for a week at each before he went on again with his air crew training. By this means, at an early stage, these young men would begin to think more and to learn more about the sister Services.

A special tribute was due to the gallant defenders of Malta. Upon that island fortress increasing fury had fallen. Day and night, almost without intermission during the first two months of 1942, Malta suffered 394 air attacks.

March, 1942—February, 1943

The main functions of the Royal Air Force at this time may be stated as: first, to shield our war industries, centres of transport and communication, and our homes from the attacks of the enemy; secondly, to take its share with the Navy in the defence of our sea routes and in the counter-offensive against the German submarine; thirdly, to combine with the other two Services in offensive operations against the enemy's air, land and sea forces; and fourthly, to carry the war into the enemy's country by attacking his war industries and transport, and the bases of his naval and military power in Germany, Italy and in Occupied Territory.

The air defence of Great Britain was the primary responsibility of Fighter Command. But not by any means its only responsibility, for it also played its full part in combined operations with other Services, like the combined raid on Dieppe, the defence of our sea routes and in the air offensive against Germany.

Throughout the whole of the year there was a formidable German bomber force in Western Europe. The soundness of the air defence of Great Britain—fighters, guns, searchlights, balloons and warning system—had been a strong deterrent to ambitious German enterprises whether by day or night. In the three months December, January and February, for example, of 392 aircraft which crossed our coasts by day 46 were destroyed, in addition to a large number probably destroyed and damaged; while, in the same period, of 240 aircraft which crossed our coast by night 26 were destroyed in addition to probables and damaged.

The most notable feature of our defence against the sneak raiders was the remarkable success of Typhoon squadrons in catching and destroying them. One squadron of Typhoons alone had destroyed in January and February no less than thirteen German aircraft.

The fighter battles in the Far East in India and in Burma, in Egypt, Libya, North Africa and Malta, were largely fought by pilots and squadrons, commanders, staffs and controllers selected and trained by Fighter Command. Three squadrons of Spitfires, two of them squadrons of the Royal Australian Air Force, were sent to Australia from this country during the year, and it was fitting that just as Australian squadrons were fighting alongside our squadrons in many theatres of war, so a squadron from Britain with Australian squadrons trained and equipped here in England should be sharing in the defence of Australia. In an attack on Darwin on 2nd March, 1943, these Spitfire squadrons shot down without loss to themselves six out of a total raiding force of fifteen Japanese aircraft.

In the war at sea, all the operational Commands of the Royal Air Force at home played their part. Army Co-operation Command, in reconnaissance and in attacks on German communications and ships, Fighter Command, in attacks upon railway and and canal communications, on U-boat bases, and on ships and in the protection of convoys round our coasts, on which nearly 50,000 fighter sorties were flown in 1942.

Bomber Command, too, 49 per cent. of whose targets in 1942 were predominantly, but not of course, wholly, naval targets. There was a nine-fold increase in 1942 as compared with 1941 in the number of mines laid and, although information about results was difficult to obtain at the time, we knew that a very substantial number of ships had been sunk. In all, during the past two years the R.A.F., in all theatres of war, had sunk or seriously damaged more than one and a quarter million tons of enemy shipping. The shortage of shipping resulting from these operations and still more, of course, from those of the Royal Navy, had a most serious effect on Germany's communications, and Germany's ability to move vital supplies of iron ore and aluminium from Scandinavia to her war industries.

So all the home Commands of the R.A.F. joined in the war at sea; but it was Coastal Command which had war at sea as its main pre-occupation. The expansion of this Command during the past year had been rapid, and their squadrons had been equipped with aircraft of longer range and greater capacity for carrying bombs and depth-charges. Wellingtons, Halifaxes, Fortresses and Liberators were now working on our sea routes and maintaining the

offensive against the German submarines. New weapons and many strange contrivances had ripened to the point of production and were now being used to increase the effectiveness of the patrol of our sea routes from the air, and of our attacks upon the U-boats.

The grim battle with the U-boats demanded shrewd planning, meticulous analysis of operational results and unceasing scientific inventiveness. Better bombs and depth-charges and new navigation and radio aids had been introduced. A large convoy might cover several square miles of sea, but to pick it up in dirty weather -perhaps 800 miles out, perhaps a thousand miles out—was a thing we could not have contemplated a year before. Extraordinary skill was required to navigate with accuracy through gales and cloud over the vast spaces of the sea. These Coastal Command crews flew in all weathers, faced all dangers, and endured the monotony of being cooped up in their aircraft for perhaps more than twenty-four hours at a stretch.

During the twelve months the air cover provided by Coastal Command on the one side and by the Royal Canadian Air Force and the United States Air Forces on the other, over convoys crossing the Atlantic had markedly improved. Experience had shown that air cover was a major factor in defeating the U-boat.

Perhaps the most important single task which fell to Coastal Command during the year was the provision of air cover for the convoys carrying the Allied Expeditionary Force to North Africa. In this, Coastal Command was helped by Bomber Command and by the 8th United States Army Air Force Bomber Command. All the convoys passed at right angles across the paths of the submarines moving to and from their ports in the Bay of Biscay. Yet so active were the air patrols that the various convoys arrived at their assault position not only without the loss of a ship, but without, so far as we know, even being sighted by a single German submarine. At sea, therefore, help was afforded the Royal Navy in the war against submarines, in the protection of convoys, and in strategical reconnaissance. They, on their part, protected the convoys which carried air reinforcements and air supplies.

A striking example of the services rendered by the Royal Navy to the Royal Air Force was the carriage during 1942 of no fewer than 744 fighters to the point at which they were flown off to the reinforcement of Malta. Also squadrons of the Fleet Air Arm had worked and fought with the Royal Air Force from shore stations at home and overseas. At the same time, the cohesion between the Royal Air Force and the Army grew ever closer. In the operations in Burma, Field-Marshal Wavell had described the support given by the Royal Air Force to the Army as "both close and good."

Our Air Forces in India had been strongly reinforced and were being organized on broad and sound foundations. The Indian Air Force, too, was growing, and the Air Officer Commanding commented very favourably on the work of No. 1 Squadron during the Burma

Campaign.

In the Middle East the course of the fighting had been marked by the growing strength and superb efficiency of the air forces under Air Chief Marshal Tedder, and by the increasingly close knitting together of Army and Air; American squadrons too had fought magnificently alongside our own. In six days during the month of September, 1942, the Royal Air Force dropped 800 tons of bombs, or one bomb every 71 seconds day and night, with an estimated average concentration of 25,000 lbs. of bombs per square mile per hour. Nine hundred and twelve fighter sorties were flown on bomber escort during the same six days, and not one bomber was lost from escorted formations.

The outstanding features of the El Alamein campaign from the air point of view were the success of the attack against Rommel's seaborne supplies, which made him short of petrol and other necessaries, before the battle started. the achievement from the outset of almost total air superiority enabling a very great proportion of our aircraft to be employed in attacking the enemy on the ground, and the manner in which, throughout the great advance, the squadrons kept up with the forward elements of the Army, leap-frogging from one landing-ground to another, arriving there almost as soon as the enemy had departed; while the transport aircraft supplying the squadrons carried wounded men back to hospital. Between the opening of the Battle of El Alamein on 23rd October, 1942, and the end of February, 1,075 enemy aircraft were captured—some of them intact on landing-grounds, besides 402 destroyed in air contest during the same period, a total of 1,477 destroyed and captured as against our loss of 345.

In this advance also was found proof of the fighting spirit and good training of the Royal Air Force Regiment. Never was the Royal Air Force Regiment intended only for the defence of airfields at home. Its duty was to defend against attack air bases in the forward areas, from which our offensive forces were operating, both in this country and overseas. Such

was the spirit they showed in the Western Desert that on more than one occasion they pressed forward to occupy an aerodrome in the van of the advancing infantry. Similarly, in Tunisia, the Royal Air Force Regiment had been in the forefront of the occupying forces.

The outstanding achievements of the glorious 8th Army and the Western Desert Air Force, and the close and intimate combination between them, both in the retreat from El Gazala and in the advance from El Alamein, were clear proof of the close cohesion existing between the Services. General Auchinleck, General Alexander and General Montgomery, in close understanding with Air Chief Marshal Tedder and Air Marshal Coningham, had worked out practical methods of combination between ground and air forces which proved their soundness and served as an example in all future operations.

In a campaign such as that in the Western Desert, the Army had one battle to fight—the land battle. The Air Force had two. First, it must meet the enemy in the air; then it could intervene in the land battle, hitting the enemy land forces with all its strength. Gone were the old conceptions of the air umbrella over the Army and the squadrons split up into penny packets at the call of Commanders of small land formations. A division might report a concentration of 200 motor transport on its front, accompanied by armour, but it might be right to reject their request for air attack, for eighteen or twenty miles away there might be a concentration of a thousand or more motor transport, indicating an armoured division or an even larger force. This concentration would probably affect the whole battle twelve, eighteen or twenty-four hours later, and it might be necessary to concentrate the whole weight of air attack on the big concentration and leave the smaller one to the troops on the ground.

Before and during the advance from El Alamein, it was not only the Western Desert Air Force that was engaged in the air battle. Behind it was the strategic air power operating under the orders of Air Chief Marshal Tedder in Cairo; and operations, which were co-ordinated with those of Air Chief Marshal Tedder by the Chief of the Air Staff, Sir Charles Portal, in London, were conducted by Bomber Command against centres of supply and communications in Italy. So bombs were sinking ships, smashing harbours and cutting Axis supplies needed for the battle hundreds and even thousands of miles away from El

Alamein.

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These facts will disabuse any illusion that the Royal Air Force was fighting a separate war. True, it was fighting in a different element from the Army and the Navy. No longer was it the Air Force commanders alone who claimed that they must control the battle in the air. No longer was it disputed that the Royal Air Force must exercise command of the available air power, with centralized control; that the supreme value of air power lay in its flexibility, which enabled it to be directed rapidly from one objective to another; that the most ruinous error was to tie up air power in penny packets; that the soldier must not expect or wish to exercise direct command over air striking forces; and that the system in force in North Africa was one which gave the Army the most complete air support at the time and place required.

In North-West Africa our squadrons had to fight in very adverse conditions. While the enemy were able to use fine modern airfields at Tunis and Bizerta, our squadrons had to use much more primitive airfields without concrete run-ways, and deep in mud. Moreover, our squadrons had to cross the mountains to reach the battle area, so low cloud and bad weather were much more of a handicap to us than the Germans. Nevertheless, the British and American Air Forces in North-West Africa destroyed 767 enemy aircraft, while their losses amounted to 392, of which the Royal Air Force lost 171. General Anderson spoke enthusiastically of the support given to him by the Royal Air Force. "I cannot tell you," he said, "how grateful we are for the splendid help you have given to the 1st Army."

This campaign was notable for the first employment of our servicing Commandos. They were composed of highly skilled mechanics trained to fight—men with a spanner in one hand and a tommy-gun in the other. One particular Commando maintained four fighter squadrons at a high rate of operations for approximately three weeks. The squadron and maintenance personnel, working in the early stages on aerodromes deep in mud, in extremely primitive conditions, and with meagre supplies reaching them along slender lines of communication, showed infinite resource. During the first month that two Wellington squadrons operated in North-West Africa they dropped over 700,000 lb. of bombs, and their serviceability averaged over 80 per cent. Behind the squadrons, the repair and salvage units organization was gradually built up until, by the end of February, 1943, the Air Officer Commanding was able to report that the equivaalent of six day fighter squadrons and one night fighter squadron, in addition to Blenheims, Hudsons, Wellingtons and Mosquitos, had already been repaired and sent forward to the front-line squadrons.

The lessons of these combined air, land and sea operations in Africa were being learnt and applied by Army Co-operation Command in Great Britain. It was not only, however, on the squadrons of Army Co-operation Command that the Army would rely when it was fighting on the Continent of Europe. The whole resources of the Royal Air Force would be united with those of the Army to destroy the air and land power of the enemy. Accordingly, bombers and fighters trained and exercised with the Army. In addition to the Army Cooperation squadrons a number of special tankbuster and fighter-bomber squadrons had been formed for the particular purpose of giving close support to troops in battle. The Commander-in-Chief of Army Co-operation Command had visited the Middle East and seen the Western Desert Air Force in action. In addition, officers from the Middle East had returned to this country and given the benefit of their recent experience and participated in combined Air-Army exercises. So the process strenuously continued of uniting and knitting together the Army and Air Services.

The activities of Bomber Command were designed to help in the war at sea and in the war in Africa. The main object, however, of all our operations during the year had been to intervene effectively in the land struggle in the East and to take as much weight as possible off our Russian Allies. Fighter Command sweeps and escorted daylight bombing raids were an important part of this policy. No longer could the Germans afford parity of loss with the Allied Air Forces. They needed to conserve their strength. Accordingly, it was necessary to sting them into action by bombing sensitive targets. The advantage in air fighting lies with the air force fighting over its own territory, as was shown in the Battle of Britain, in the operations over this country, and again in the heroic island of Malta, where in the year we had shot down 917 enemy aircraft for the loss of 363. In these offensive sweeps, on the other hand, our fighters found the enemy fighters in position, taking every advantage of cloud and light, and the necessity of protecting the bombers limited their power of manœuvre. Nevertheless, parity in the infliction of casualties—and much more besides—was achieved by our splendid pilots, a remarkable proof of their prowess and of the superiority of

their tactics, training and equipment over those of the enemy. We had lost 600 fighter aircraft shot down by German fighters and guns. But our fighters and guns had inflicted a loss over this country and France during the same period of 655 on the enemy. Moreover, of more than 2,500 bombers escorted by our fighters, fewer than fifty had been lost. The result of these attacks had been to compel the enemy to keep his finest fighters and pilots in Western Europe all through the hard battles in Russia and in Africa.

The German Army in Russia was clamouring for air support. Yet little more than a quarter of the German fighter force was strung out from the White Sea to the Black Sea, and nearly double that number was held in Western Europe by the offensives of Bomber Command and Fighter Command. In addition, important factories working for Germany in Occupied France had been destroyed, transport had been dislocated and, in particular, the attacks on locomotives had filled French railway workshops to congestion and made them into ripe targets for our day bombing. Of those targets our day-bomber squadrons and the redoubtable American Fortresses and Liberators were taking full advantage. In the last four months of 1942 bombers and fighters operating from this country destroyed or seriously damaged 100 locomotives.

The year had been marked by striking changes in the conduct and effectiveness of the bomber offensive. There had been a great advance in our method of handling the bomber force as a single flexible hard-hitting weapon, and in our means of finding and concentrating an attack upon the selected targets. Our bombs had improved. The 1,000-bomber raids, the 1,000-ton raids, the devastation of a long roll of German cities, and the heavy daylight attacks carried into the heart of Germany and Italy marked the year as a period of successful exploitation of progressive tactical and technical developments.

The weight of our attack increased steadily. In each separate month during the year more bombs had been dropped than in the corresponding month a year before, and the relative increase had been particularly marked in the latter half of the year. In spite of bad weather, the tonnage of bombs dropped in January, 1943, was only surpassed three times in 1942. In February, with a delivery of over 10,000 tons of bombs, including three 1,000-ton raids, Bomber Command dropped more than half as much again as in any previous month. In the

first ten days of March more than 4,000 tons of bombs had been dropped.

In Italy, Milan, Turin and Genoa had been attacked with heavy damage.

New tactical methods of attack by night were successfully tried out during the year. The monster raids saturating the enemy's active and passive systems of defence was one example. A second was the success achieved in finding, marking and illuminating targets.

The year witnessed the deployment in this country, side by side with our own forces, of increasing numbers of American heavy bombers. Many of these left later for Africa, but more were coming to take their place.

March, 1943—February, 1944

On 1st April, 1943, the Royal Air Force celebrated the twenty-fifth year of its foundation. Born in the critical months of the first World War, in this greater struggle it had grown to strong manhood and had nobly justified the faith of its creators. The heroism of its pilots and crews, the determination and resource of its commanders, the foresight, freedom and supple realism of its staff thought and doctrine, and the devotion and skill of all the men and women who worked for it on the ground, had enabled the Royal Air Force to add lustre to its own traditions and to render faithful and glorious service to its King and Country.

Achievements of Coastal Command

Coastal Command maintained a close working partnership with the Royal Navy in the Battle of the Atlantic. The Battle of the Atlantic was not a series of single combats between the U-boat and the aircraft or the warship, but was made up of prolonged engagements over thousands of miles of sea, in which the work of the surface forces was at every stage integrated with the work of aircraft. The aircraft and the escort vessel were nicely complementary; the escort vessel carried a bigger punch and could track down a U-boat, once detected, even though submerged, but the range of vision of the escort vessel was limited; the aircraft was less certain of its kill but had, of course, an immensely greater range of vision and a better chance of surprising the enemy. A convoy might be assailed along the whole route across the ocean, first by U-boats and then by bombers, and, at every stage, the work of the air and escort vessels on the surface was interlocked. Never had there been a happier period of relations between the Royal Navy and the Royal Air Force than in this year. Like the harmony which prevailed between land and air forces, the combination of air and naval power was the fruit, not of radical changes of organization or of direction from above, but of the steady efforts of Commanders and Staff Officers of the two Services engaged in the pursuit of a common enemy.

The war against the submarine was especially a war of wits. The enemy had sprung surprises, but still more surprises had been sprung on him. The many units of Coastal Command. in which American squadrons were now serving alongside those of the R.A.F., stretching from Iceland to Gibraltar and the Azores, sweeping the whole of the Atlantic, had a long task of vigilance and of danger too. Most of their work—perhaps the most trying part—was taken up with long and uneventful sweeps over barren seas, but there were many occasions when they had to meet formidable opposition. They flew in low, these coastal crews, to drop their depth charges. The Germans had increased the numbers of anti-aircraft guns carried by their U-boats in order to force up the coastal crews to heights at which the accuracy of their bombing would fall off. But the crews had roundly declared that they would not be forced up—and they were not forced up. The action for which the Victoria Cross was awarded to Flying Officer Trigg, when he pressed home his attack with absolute disregard of the heavy anti-aircraft armament with which U-boats were now armed, though he knew that his aircraft was already hit and in flames and that his only course of safety lay in breaking off the engagement, typified the spirit of these crews in this hazardous and exacting work. Admiral Doenitz, the Commander-in-Chief of the German Navy is reported to have said—though it is difficult to understand how an officer who supposedly was competent could have made such a remark that an aeroplane could no more attack a submarine than a crow a mole. The mole had turned himself into a porcupine, but he still could not escape Coastal Command's talons.

In operating against surface shipping, the Command had a year of extended activity and considerable success. Careful attention had been given to Germany's coastal traffic, particularly the route from the iron mines of Norway to the Rhine ports, and together the Beaufighters of Coastal Command, with their great variety of armament, and the sea-mining aircraft of Bomber Command sank quite a proportion of this traffic.

Air Activities in Far East

Our forces in the Far Eastern theatre were being built up and the Japanese had lost the air superiority they enjoyed in 1942. A notable event was the arrival of Spitfires in this theatre. The, squadrons sent to Australia acquitted themselves well in attacks which the Japanese made on Port Darwin and other towns, and in Burma, Spitfires appeared where the Japanese had been expecting Hurricanes, and in their first two encounters these Spitfires destroyed twenty-one of the enemy for the loss of only three of their own.

Mediterranean Air War

In the Mediterranean, our air forces played a vital part in the great events of this year. The surrender in Tunis of an enemy army of 250,000 men was followed by great amphibious operations, each successfully covered by air power. They knocked Italy out of the war and drew down to the Italian fronts large enemy forces badly needed elsewhere.

Air Marshal Slessor, the Deputy Commander-in-Chief, under General Eaker, of the Allied Air Forces in the Mediterranean, remarked in a report that this phase of the campaign reminded him of his experience in Waziristan, except that the weather was like a bad English February. As the pilots put it, the clouds were stuffed with mountains. The airmen searching in valleys and ravines for the enemy positions, so far from seeing their target, could not even see which was valley and which was mountainside.

How the different methods employed by the enemy and the Royal Air Force in land campaigns had struck so discerning and experienced an observer as General Arnold, the Commanding General of the U.S. Army Air Force, was recorded in a formal report to the Secretary of War of the United States. Of the early Libyan campaigns, he says that the enemy kept his Air Forces under the direct command of the Ground Forces.

"Local Army commanders," he says, "wasted air power in penny packets to protect their own sectors or to help advance small detachments. The Royal Air Force, employed in concentrated mass as a true air force should be, completely destroyed some 1,100 Italian planes." He added, "Many of our present ideas about the Tactical Air Force were evolved in the heat of these desert campaigns. There is no doubt that experience and new conditions modify many of our notions, but the present concept of the Tactical Air Force can be re-

garded as tested and proved in North Africa,

Italy and New Guinea."

On 18th February, 1943, a group of British and American officers gathered at Constantine, Algeria, to activate officially what subsequently became the powerful Mediterranean Allied Tactical Air Force. Born in the dark days of the German drive at Kasserine Pass, M.A.T.A.F. lived to see great victories in the theatre where the Allies first took the offensive.

In the two years since M.A.T.A.F. was formed, its American, British, Dominion, French and Brazilian aircraft flew more than half a million sorties and dropped approximately 240,000 tons of bombs on enemy in Tunisia, Libya, Pantellaria, Sicily, Sardinia, Corsica, Italy, Greece, Albania, Yugoslavia, Bulgaria, Austria, France and Germany.

Of significance is the pioneering done by M.A.T.A.F. in the development of tactical air power. Formation of M.A.T.A.F. as an overall air headquarters on an equal plane with Field-Marshal Sir Harold L. G. Alexander's 18th Army Group was the first recognition of the true role of tactical air power as a powerful independent arm whose effort must be closely co-ordinated with the ground forces on an army group level. Previous tactical air units had been attached to each army. Here again, the pattern originated in the Mediterranean was subsequently followed in other theatres.

Two of the best-known and most experienced tactical air leaders of this war have been M.A.T.A.F.'s two commanders, Major-General John K. Cannon, U.S.A.A.F., who took over command of M.A.T.A.F. on 2nd January, 1944, from Air Marshal Sir Arthur Coningham, K.C.B., D.S.O., M.C., D.F.C., A.F.C., who presided over the activities at Constantine.

M.A.T.A.F. was formed to co-ordinate under a single directing head the three scattered tactical air arms then functioning in North Africa. Air Marshal Coningham, head of the Desert Air Force supporting the 8th Army, brought with him the experience gained in the Western Desert.

General Kuter brought his experience gained as commander of the units supporting the American Second Corps. Other R.A.F. officers were brought from tactical squadrons behind the 1st Army. These leaders helped to co-ordinate the tremendous aerial assault which turned the Battle of Kasserine Pass into an overwhelming Allied victory.

Within a few weeks when the 8th Army moved into Tunisia from the south, the M.A.T.A.F. was directing its three subordinate arms as one, striking concentrated air blows

in support of first one sector and then another.

The air tactics conceived in the desperate battles of Libya and Tunisia, and improved during the bitter campaigns in Sicily and the Salerno landings, reached their climax with "Operation Strangle." This was the aerial blockade of German armies facing Anzio and Cassino that helped Allied ground forces in their drive that took Rome and ultimately over-ran Florence.

Another model for students of air tactics in every theatre was provided by M.A.T.A.F.'s support of the American 7th Army in the invasion of Southern France and the subsequent pursuit of the Germans north to the Vosges.

Most unusual in this campaign was the miracle of supply exclusively by the Air Force that kept rations, gasoline, bombs and ammunition always available to front-line fighter-bombers in one of the fastest moving campaigns in history.

Some idea of the tremendous losses the M.A.T.A.F. caused the Axis in its two years of campaigning is shown by the results of bombing and strafing attacks. During 1944 alone, M.A.T.A.F. destroyed or damaged 25,000 motor and armoured vehicles, 18,000 rail cars, and 2,783 locomotives. A total of 542 enemy planes were destroyed in air combat, a large number probably destroyed or damaged, and a great many more aircraft were destroyed or damaged on the ground.

The Mediterranean campaign was the chief testing ground for our methods of combining air and surface forces in one great instrument of war. It did not matter whether this instrument was in the hands of a soldier or an airman or a sailor. In the European theatre the supreme commander was a soldier, General Eisenhower, but his deputy was Air Chief Marshal Tedder, an airman. What mattered was that the air forces should be commanded by an airman and the troops by a soldier, each working to a common plan. The presence of Air Chief Marshal Tedder and of Air Marshal Coningham in the European theatre was a guarantee that the methods employed in Air-Army operations in that theatre would be those which had been tested and proved by experience in the Mediterranean theatre.

Battles for Liberating Europe

In great Britain the Royal Air Force was preparing to play its part, in combination with the Army and the Royal Navy, in the battle for liberating Europe. A year before Fighter Command and Army Co-operation Command had both existed as independent Commands. The latter was designed solely for working with the Army. Fighter Command not only defended this country and escorted coastal convoys, but also carried out offensive operations across the Channel. These two Commands were now combined with the American 9th Air Force into a new organization described as the Allied Expeditionary Air Force under the command of Air Chief Marshal Leigh-Mallory. This Force had two main components. On the one hand, the 2nd British Tactical Air Force, under the command of Air Marshal Coningham, and the 9th American Air Force, under General Brereton, was available to support operations on the Continent of Europe; on the other hand, a force for which we had revived the old name of Air Defence of Great Britain, under the command of Air Marshal Hill, was now responsible for the day and night defence of the British Isles. The offensive and defensive functions were thus separated and defined, while at the same time unifying them at the highest level for the great and intricate battles These squadrons, both in the Allied Expeditionary Air Force and in the Air Defence of Great Britain, were actively engaged in training as well as in operations. They were not standing idly by waiting upon events, but they were constantly attacking objectives in France and the Low Countries, or ships at sea or in harbour, escorting bombers in their attacks on occupied territory, and also giving escort to American bombers on their way out or on their way home from battles over Germany.

During this period, night-fighter squadrons of the Air Defence of Great Britain had been tackling a recurrence of the blitz. The kind of attack they had to meet was one which it was very difficult to counter. Whereas our bombers penetrated hundreds of miles into German territory in a thick stream, fighting all the way into the target, over the target and all the way home, and making while they were over the target concentrated and devastating attacks, the Germans flew very fast across the coast at a great height, twisting and turning, scattering their bombs over London, then diving steeply at maximum speed until they crossed the coast at 2,000 feet or less. Probably the whole time spent by any one German bomber over this country was less than twenty minutes.

Bearing in mind these extraordinary difficulties of countering this form of haphazard and militarily futile attack, the rate of casualties inflicted on the enemy was creditable to our night-fighter squadrons and to the anti-aircraft gunners and searchlight crews of the Army. The measure of our success was that in each of the last two months of this period we inflicted on these raiders a higher rate of casualties than all the massed fighter defences of Germany had been able to inflict on our far more numerous bombers penetrating deeply into enemy territory.

Bomber Offensive

Meanwhile, the battle which Bomber Command and the United States Army Air Forces were fighting over Germany was on so different a scale that it is impossible to compare it with the German blitz on this country. Huge centres of war industry in the Ruhr, in Hamburg, in Berlin and many other German cities had been obliterated, and in the year under review the United States Army Air Force had entered the battle in full strength. A spell of weather of a kind which favoured daylight precision bombing also enabled the British and American Bomber Commands to combine both day with night operations and operations from Italian bases with those from British bases. The British and American commanders were swift to seize this opportunity and to act upon plans which had been prepared for many months previous. It might well be that historians of the future would look back upon this period between the February and the March moons as one of the decisive stages of the whole war.

The offensive justified itself by the fact alone that it was keeping from the Eastern and Mediterranean fronts aircraft, men and guns that the enemy might have used to turn the battles there. Bomber Command and the United States Bomber Squadrons compelled the German High Command, as their whole front recoiled in the East, to tie down for the protection of their factories fully four-fifths of their fighter strength in the West. This is the true strategic employment of air power, turning the course of the land battles by actions fought many hundreds of miles away. Now we could claim not only that we had engaged these forces, but that we had made great gains in spite of them. The effects were identical with those of military occupation; we had destroyed production, we had denied resources, we had interrupted communications and we had carried the war on to German soil.

Losses

Certainly, our gains had not been won without losses. From bombing operations from this country in the year under review over 2,500 aircraft had not come back. Taking an average of seven men per aircraft, that meant nearly 18,000



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H. A. JONES, C.M.G., M.C.

(See following page)

H. A. Jones, C.M.G., M.C.

THE death of H. A. Jones in an air accident off the Azores in March last is a loss to the Royal Air Force not easily to be measured.

Of those who came to know H. A. Jones in his capacity as Director of Public Relations of the Air Ministry, few can have failed to recognize in him that wealth of knowledge and understanding only acquired from long years of devotion to the interests of the Service.

His first acquaintance with the Air Force was in 1917. In the spring of that year, as a Subaltern in the Wiltshire Regiment, he transferred to the Royal Flying Corps as an observer in No. 47 Squadron—then operating in Macedonia. His active-service flying was, however destined to be brief. On 20th August, 1917, while taking part in a raid on Prilep he was severely wounded. That he survived that day may be counted amongst those acts of Providence, bordering on miracles not uncommonly found in air warfare. When leaving the target the small British force was engaged and split up by a strong formation of D.V. Albatros fighters—the best fighter of that period. The German pilots, as was their normal practice, concentrated on the weakest unit—a slow Armstrong Whitworth machine flown by Lieut. F. W. H. Thomas, of Rhodesia, with Lieut. Jones in the back seat. Within a few minutes Thomas had been mortally wounded in the back and Jones was hit in the stomach, mouth and left hand. His Lewis gun was shot out of action, but not before he had sent down three of his attackers. For the next thirty minutes the helpless bomber and its crew were at the mercy of the remaining German fighters. Closing to point-blank range they raked the Armstrong Whitworth from end to end with their twin guns but Lieut. Thomas kept flying and, partially paralysed and in a fainting condition from loss of blood, succeeded in regaining his aerodrome and making a perfect landing. He died four months later.

H. A. Jones, after a year spent in hospital, recovered but with a useless left hand. The ordeal of that thirty minutes, however, never completely left him, although his only complaint of his disability was the extra cost of shirts arising from the necessity of having to pull off his right sleeve with his teeth. He was awarded the Military Cross and French Croix de Guerre with palm.

In the autumn of 1918 he was attached to the air historical section of the Committee of Imperial Defence as an assistant to Sir Walter Raleigh, of Oxford, recently appointed Air Historian. This association undoubtedly had a profound influence on his character in subsequent years; those privileged to know Sir Walter Raleigh might have recognized in H. A. Jones many of his greatest qualities.

Sir Walter Raleigh, after completing the first volume of the history, contracted typhoid during a visit to the Middle East and died in 1920. Two years later H. A. Jones was appointed to complete the work. He was then under thirty years of age and faced a task which many older but lesser men might have hesitated to accept. To follow one of the greatest masters of English prose was difficult enough but there were many other obstacles. The story to be told was not only that of one service (the R.A.F. had only been in existence for a bare seven months of the war) but of the air services of the sea and land forces themselves. Naval, military and air records, forming the material from which he had to work were either sketchy or non-existent. At that time, too, there was a natural apathy to war history: everybody was tired of war and everything connected with it. They wanted to forget rather than be reminded by contemporary historians. Economies reduced research staff to a minimum.

Despite these difficulties, which at times became almost unsurmountable, the remaining five volumes of the war in the air were completed. It was entirely due to the tenacity and singleness of purpose of Henry Jones that the Royal Air Force has to-day a full-scale history of its achievements in the first major war in which aircraft played a part. Of the world's air forces, that of Great Britain alone has such a history.

His services to the R.A.F. in the Second World War were also of an active nature. At Christmas, 1939, while serving at the Air Ministry he was appointed to the United Kingdom Air Liaison Mission in Canada. His selection for that post was an act almost of genius. In Canada he found a country and people to which by nature he was perfectly attuned. The four years which he spent in Ottawa he freely acknowledged were among the happiest of his life. This was reflected in the success of his mission and in the value of the work he was able to perform in furtherance of the great Training Scheme with which he was intimately associated.

Of Sir Walter Raleigh, as Air Historian, R. A. Jones wrote in 1922:

"At the height of his powers he was touched and taken by the long arm of war. He loved the wide wide world. He loved dearly his fellow men. To be with him was to lose pettiness. He was a great Englishman."

Those who knew him best will understand how faithfully those words, twenty years later, applied to the author himself.

Digitized by Goog J. C. NERNEY.

men, drawn from the flower of our manhood, were killed or prisoners. But compare this with the bloody fighting of the Eastern Front, or with the carnage of the last war. On one day, 1st July, 1916, we lost on the Somme 21,997 men killed and missing, to secure an advance three and a half miles wide and one mile in depth. Our air crews who had fallen in destroying the weapons of the Nazis at their sources were in the position of the man who died putting out of action the enfilading machine gun which was decimating his comrades and so let the advance go through. It may be added that our losses were becoming progressively less heavy compared with the effects we were achieving. The ratio of casualties to the weight of bombs dropped was steadily falling, in spite of the fact that the range of our attacks had been steadily increasing. Berlin received in January of this year, in a single month, as great a weight of bombs as had fallen on London from the beginning of the war till now.

March, 1944—February, 1945

The story of the air war in this year is, largely, the story of the Royal Air Force and the United States Army Air Force, working in the closest partnership and harmony for the destruction of the common enemy. Their tasks were complementary, their fortunes intertwined. Together they had achieved mastery of the air over Germany and the battle area. The extent of their mastery was illustrated by the reduction in the casualties incurred by squadrons of Bomber Command. In 1942 the bomber squadrons lost 4.1 per cent. of the aircraft despatched; in 1943 they lost 3.7 per cent.; in 1944 the figure fell to 1.7 per cent.; and for the first two months of 1945 it was as low as 1.1 per cent., although an increasing number of operations were being carried out by day.

The power of the Allied Air Forces—which, of course, included many squadrons from the Dominions and our European Allies—had increased, was increasing, and continued to increase until Germany was beaten. In mere numbers it is true that the Royal Air Force had reached the peak of its expansion; but its power did not depend only on numbers, but on the prowess of its aircrews, commanders and staffs, and on its technical and scientific equipment, which was becoming ever more formidable with each month that passed. Therefore, without diminishing the total current impact of the Royal Air Force on the enemy, the aircrew training organization was in process of reduction to the level required to maintain the smaller air force which would be operating after the defeat of Germany. Much of the air training had, of course, been given in Great Britain, but in the early months of the war agreements were made under which Canada, Australia, New Zealand, South Africa and Southern Rhodesia undertook to provide a great deal of the training of the aircrews required, not only for their own Air Forces, but also for the R.A.F., and not only their own young men but young men from this country as well. They also provided the airfields, the buildings and most of the instructors and ground staff. That was a big task, especially when we remember how small were the Dominion Air Forces at the outbreak of war.

Soon, however, it became necessary to make further demands on the Dominions. In 1940 Great Britain was shut out of the Continent and threatened by invasion, and much of the training which had hitherto been carried out in this country had to be transferred overseas. These additional tasks were readily undertaken, triumphantly completed and, as need arose, ungrudgingly extended. Many of the Dominion aircrew trained in these schools had been formed into Canadian, Australian, New Zealand, South African and Southern Rhodesian squadrons, and many more had gone into Royal Air Force squadrons. Not far short of 200,000 young men, many of them from Great Britain, had received their flying training in the Dominions. All played a distinguished part in operations against the enemy.

It was on the sure foundation of this great Dominion training plan that the huge structure of the Royal Air Force was built. It was in the fullest sense a war-winning plan. Strategically, the British Commonwealth and Empire was taking advantage of space and distance to train its aircrews unmolested by the enemy. The United Kingdom and each of the Dominions which took part in it had good reason to be proud of its share in the success which it had achieved.

The air superiority which had enabled us to call a halt to the numerical expansion of the Royal Air Force had not been obtained without hard fighting and heavy casualties. Between 1st April and 30th September, 1944, Bomber Command alone suffered more than 10,000 casualties killed, missing and wounded. Reconnaissance and ground strafing of troops and vehicles in the battle area or in other areas heavily defended by flak was also dangerous work. On the other hand, well-planned bombing and hard fighting in the air so reduced the strength of the German Air Force that

our casualty rate had fallen far below what it was prudent to anticipate two years previously, when planning for the flow of aircrew into the squadrons in 1945. At this juncture the needs of the Army for men were greater than the Air Force, and, just as earlier in the war, men were transferred from the Army and the Navy to the R.A.F. when the latter's needs were the greatest, so now it was decided that several thousands of men should be transferred to the Anmy from the Royal Navy and the Royal Air Force. Likewise the disbanding of Balloon Command.

The pattern of the air offensive in Europe was reflected in the distant swamps and jungles of Burma. The same hammer blows from the closely integrated British and American Air Forces destroyed the enemy's dumps, airfields, bridges and all forms of land and water transport. Denied supplies and reinforcements, the Japanese had fallen a prey to our advancing troops. This in turn led to the clearance of the Burma Road with the great strategic consequence of increasing the flow of supplies to China. The Tactical Air Force element with its Beaufighter, Spitfire and Thunderbolt fighter squadrons, its Hurribomber and tank-busting squadrons, and its Mosquito bomber squadrons had worked closely fused with the Army; while the Heavy Bombers, the photographic reconnaissance units and the Coastal Squadrons all made their brilliant and indispensable contributions to the Allied victories in that theatre. Air supremacy enabled us both to starve the enemy's troops and to nourish and sustain our own. As many as three divisions had been, at one time, maintained sofely by air transport. Thus air power was opening the gate, through which the Allied Armies would pour to the liberation of the Eastern territories.

The creation and development of Transport Command destroyed the paradox that the Royal Air Force was, tactically, the most, but strategically the least mobile of the three Services. There in India and Burma, it had full scope not only in maintaining communications along its trunk and feeder services with the U.K. and with other overseas theatres, but in air-borne, air-transporting and supply operations. The greater part of the troops that captured Meiktila, seventy-five miles south of Mandalay, with its eight airfields, were carried and mourished there by aircraft of Transport Command.

In the Far East the British and American Air Forces were serving under a British Air Commander-in-Chief, Sir Keith Park. In the Mediterranean theatre they were serving under

an American officer, General Eaker, with a British air officer, Sir John Slessor, as his deputy. The Mediterranean was a theatre which provided a striking example of the versatility and flexibility of air power. The famous Coastal Air Force had many roles. Before the decline of German sea power in the Mediterranean, this group fought the German submarines and the torpedo and bomber aircraft which attacked our convoys. That work hardly kept them busy now, but they still attacked German shipping in the Adriatic, and in the Gulf of Genoa; they still carried out reconnaissance over the sea, and they still gave fighter protection to our convoys, bases and lines of communication by day and by night.

The Allied Tactical Air Forces, of which the famous Desert Air Force formed part, worked closely with the Army. The 15th United States Strategic Air Force, and British bomber squadrons working with them carried the bomber offensive into Southern Germany from Italian airfields. The Alps presented a formidable barrier—ice and snow in winter and an even greater danger in summer—heavy electrical storms; but the targets were important, and these squadrons made a big contribution from Italy to the success of the Bomber offensive. Another formation in Italy with a brilliant record of achievement was the Balkan Air Force, working closely with both the Army and the Navy, fighting the Germans and their satellites in the Adriatic and the Balkans, and supporting Marshal Tito's partisans.

The German Air Force was attempting, on a small scale, to renew the blitz on London. The unfailing skill of our night-fighter crews, of our ground controllers and of the gunners and searchlight crews of Anti-Aircraft Command, inflicted on them sufficient losses to deter them from mere harassing attacks, which were producing no military results. The German blitz petered out under the crushing blows of the Allied bomber offensive. Small numbers of fast aircraft, carrying a few bombs, got through from time to time, but not without paying their toll to Fighter Command and the A.A. guns.

So the Germans resorted in the summer of that year to the flying-bomb. The weight of the attack fell off when the sweeping advances of Field-Marshal Montgomery's armies resulted in the occupation of the principal launching sites. Launchings continued, however, on a small scale from aircraft during the winter, until the campaign was temporarily abandoned in January, 1945. The attacks restarted a few weeks later, however. In the meantime the U.K. had come under fire by the V2. Attacks

on storage sites, on supply routes, motor transport parks and lines of communication had reduced the scale of attack far below what the Germans hoped to achieve; but in the case of the rocket, as in the case of the flying-bomb, the only way to silence this form of long-range artillery was the physical occupation of the sites from which these weapons were fired and our primary object, therefore, was—in close cooperation with the Army—to hasten the paralysis and destruction of the German armies on our front and, consequently the liberation of Holland from the German invader.

To this supreme object—the destruction of the armed might of Germany—all three Services in closest partnership bended their efforts. The fruits of these efforts had been gathered in the campaigns at sea against the German U-boats and German shipping, and on land in the battle by which the German armies were being driven remorselessly back from the West, from the East and from the South, with

crippling losses in men and material.

D Day for the British and American armies of liberation was 6th June, 1944, but for the Royal Air Force the campaign had started long before. The weight of our invasion of Northern Europe would have been much reduced if the U-boats had been sinking even a fraction of the number of Allied ships which they sank in every month of the year 1943. Gradually, however, the squadrons of Coastal Command—very long range Liberators, Wellingtons with their searchlights, Fortress, Sunderland and Catalina squadrons, Beaufighters with their rockets, and Mosquitos carrying a six-pounder—working in closest co-operation with the escort groups of the Royal Navy, had obtained an increasing mastery of the German submarines. Bomber Command, too, had contributed largely to this result by bombing the U-boats in their assembly yards and in their pens, and by their arduous, difficult and extremely successful mining operations.

The Germans had boasted that, thanks to the U-boat, no Allied soldier would set foot on the Continent of Europe. Coastal Command and the Royal Navy answered this boast with deeds. Together, they swept the seas, and kept open those channel lanes on which depended the security of our convoys and the nourishment of our armies. In the opening stages of this great battle the burden of the fighting lay principally on Coastal Command. In the three weeks before D Day, Admiral Doenitz was endeavouring to move up his reserves of U-boats from their bases in Norway to the threatened area of the Channel Coast. From Norway

these U-boats began to slink out on their long trek through Northern and Atlantic waters to the Channel. The Commander-in-Chief. Coastal Command—Sir Sholto Douglas—had anticipated every move they made. Knowing what they had to expect, the German Command had given their crews a concentrated course of training against air attack. In particular, they were equipped with a new 37 mm. anti-aircraft gun. Their foresight was wise but unavailing, for these reinforcements were attacked and mauled by aircraft of Coastal Command. In the continuous daylight of the Northern summer, the battle was joined off the coasts of Norway, the Shetlands and the Faroes, and even in the Arctic, where the U-boats sought to escape the range of our aircraft. Many were sunk and damaged.

This was the opening bout. The main campaign, fought in the English Channel and its Western approaches, began on D Day. Previous to that date, single U-boats had penetrated into coastal waters with the aid of Schnorkels. When the invasion came, the Biscay U-boat fleet made their way to the Western approaches of the Channel on the surface. They were instantly engaged by Coastal Command. and U-boat prisoners frankly admitted that entering the Channel was a nightmare. During the first four critical days from D Day, the Command made thirty-eight sightings, which resulted in several destructive attacks. In every case the U-boats fought back desperately with flak, but our indomitable aircrews—heroic men like Flight Lieutenant Hornell, of the Royal Canadian Air Force, who lost his life, and Flying Officer Cruickshank, whose gallant exploits earned for them the Victoria Cross flew in low through the flak and bombed with deadly accuracy.

These successes of Coastal Command, won in unison with the Royal Navy, were decisive; a blow was inflicted on the enemy from which he never recovered. It was fatal to his prospects of holding what he chose to call the Fortress of Europe. Nor were the enemy's hopes of countering the invasion confined to U-boats. He hoped for great things from his motor gun-boats and motor torpedo-boats which were to harry the main lines of our shipping. Hardly a motor gun-boat or motor torpedo-boat put to sea without being spotted and attacked from the air. Coastal Command also carried on a sustained and deadly campaign against the enemy's shipping carrying supplies to his U-boat bases in Northern waters or evacuating his troops from Norway. The target presented by enemy shipping was incomparably smaller than that presented by our own shipping to the enemy; but, week by week, Coastal Command was sinking German ships off the coasts of Norway, Denmark and Holland.

The work of Bomber Command under Sir Arthur Harris and of the United States Strategic air forces under General Spaatz, in preparation for the launching of our armies, had been continuous over a period of years. All through 1943 and 1944 the great battles of the Ruhr, of Hamburg and Berlin, were steadily undermining the war power of Germany. We had become aware that the Germans were making a tremendous effort to build up the biggest fighter force that the world had ever seen. They were preparing to accept the defensive role and, sacrificing their bomber force, they were concentrating on building up an impregnable fighter defence. Thus the Germans were being forced to cover up against our bomber blows. The bomber offensive was proving to be the most effective defence of our homes and factories against a blitz on the great scale. Had they been left undisturbed, they would have increased their fighter production from 1,000 a month, at which it stood in the middle of 1943, to 2,500 or 3,000 a month by the end of 1944.

The British and American bomber forces, therefore, in the winter of 1943 and spring of 1944 turned their main effort against the German fighter factories and ancillary production. The German fighters struggled desperately to save their factories. Bomber Command's casualties were high, but they pressed their attacks with determination and with devastating effect. The Americans fought brilliantly, destroying hundreds of German fighters in air fighting and bombing with deadly accuracy.

General Arnold, Commanding General of the United States Army Air Force, in his annual report to Congress, says: "The week of 20th-26th February, 1944, may well be classed by future historians as marking a decisive battle in history—one as decisive and of greater world importance than Gettysburg."

That great series of attacks against the German aircraft production laid the foundation of the air mastery which the Allies enjoyed on D-Day and now enjoyed over Germany and the battlefields of Europe.

In the late spring the destruction of German communications behind the intended invasion front took first place among our bombing objectives. Bomber Command, the 2nd Tactical Air Force and the U.S.A.A.F. all played their parts in this campaign. It was not a task upon

which the Allied Air Forces entered lightheartedly, for it involved the destruction of railway facilities, some of which were in thickly populated areas of France. It was therefore bound to entail distressing loss of life among French civilians in spite of every precaution taken—and none was neglected. Marshalling vards and railway repair facilities were destroyed on a great scale. Twenty-four road and railway bridges over the Seine were selected for bombing; by D Day all twenty-four had either been demolished or severely damaged. The result of this campaign was to destroy one of the main assumptions on which the enemy's plan of defence was based. He had naturally assumed that he could reinforce his defensive front by road and rail more quickly than we could reinforce by sea. As things turned out, the weather favoured this calculation and for three critical days it was impossible to land troops or supplies over the beaches. Nevertheless, so thoroughly had the Allied Air Forces done their work, and so complete was the mastery of the British and American Tactical Air Forces over the French roads and railways by day, that the Allied armies were able to reinforce much more quickly than the Germans.

German troops were rushed into the battle piecemeal on bicycles. Two divisions which were brought from the eastern front took only five days to cross Europe to the French frontier, and then took fourteen days to travel from the frontier to the battle. Another German division, hastening to the battle from north-east France, detrained at Rouen and subsequently took fourteen days to reach the battle area on foot. Famous Panzer divisions were short of tanks and in some cases were using old French ones. The strategic plan of the Germans for countering the invasion broke against the searching weapons of air attack.

The Royal Air Force also successfully delivered two of the largest airborne formations ever taken into battle. In the first of these operations, British and American airborne forces formed the spearhead of the Normandy landing. The second operation succeeded later in forcing the Maas and the Waal, and one of the Transport Command groups which took part in these operations also successfully evacuated by air from the Continent over 55,000 casualties.

The brilliant work of the 2nd Tactical Air Force, their mastery of the air over the battle-field and their throttling grip on German communications surpassed all reasonable expectation. The slaughter of the German Panzer Divisions in the Falaise Gap by the rocket and

bomber Typhoons of the Tactical Air Force was a brilliant exploit. Under the command of Sir Trafford Leigh-Mallory—whose loss in a flight to the Far East to take up command of the South-Eastern Asia Air Command was such a heavy blow to the Royal Air Force and to the country—and of Air Marshal Sir Arthur Coningham, the closeness of the partnership between the Tactical Air Force and the Army, under Field-Marshal Montgomery, was assured. Together they operated in the spirit of Field-Marshal Montgomery's declaration that the first and great principle of war is that you must first win your air battle before you fight your land and sea battle; and, as he added, we never had to bother about the enemy in the air because we won the air battle first.

Two activities of Bomber Command call for special mention. The first is the sinking of the "Tirpitz," the greatest of the German battleships and perhaps, in her time, the toughest ship afloat. She had already suffered rough usage at the hands of the midget submarines of the Royal Navy and the aircraft of the Fleet Air Arm. She was sunk by two squadrons of Bomber Command under Wing Commander Tait. They flew 1,200 miles to bomb from some 15,000 feet and scored three direct hits and two near misses. This brilliant feat of arms was accomplished by British crews aiming, with a British bombsight of extraordinary complexity, ingenuity and accuracy a 12,000 lb. bomb of British design and manufacture from a British Lancaster—at the time the only aircraft in the

world which could carry that bomb.

The other activity of Bomber Command mainly but not solely of Bomber Command, for other commands overseas and to some extent at home shared it—is one of which little mention has yet been made. When the peoples of Europe awoke from the nightmare of 1940, they found themselves powerless against the mechanized might of Nazi Germany. To the Royal Air Force fell the task of supplying arms to the resurgent peoples of Europe. A plan to arm the patriots of Europe was drawn up between the Services. A small force of aircraft was allotted to the task. First, Whitleys carried out these missions. Then they were replaced by larger aircraft—by Halifaxes, Stirlings and Liberators—and in greater numbers.

The task was exacting. Every crew was a pathfinder. They were searching, not for towns or marshalling yards, but for fields and points in the open country—often miles from roads or other landmarks. This entailed extremely low flying, with the aircraft—especially if it was a light night—an easy mark for even the lightest

flak. In difficult country the navigation risks were almost as formidable as the risks from the enemy. Frequently pilots had to land their aircraft in occupied territory to bring out leading members of the Underground Movement.

For example, it became necessary in the spring of 1944 to bring out of South-East Poland some staff officers of the Polish Underground Forces. Two days before the operation was due to take place the suspicion of the Germans in the district was aroused. The local peasants and farmers, all members of the underground organization, were mobilized. Their rifles, pistols and hand grenades were taken out of the hiding-places where they were kept between the battles which the Polish secret army had been fighting for four years and were put into action. For forty-eight hours the brave Poles fought. They lost forty-two men killed and many wounded, but they kept the landingground—a field of stubble—clear. A Dakota aircraft, flown by a British crew with a Polish navigator, flew in, landed safely, and five minutes later took off with its important passen-

The Women's Auxiliary Air Force had been to the fore in these activities. Several young W.A.A.F. officers were dropped by parachute at night. In one case, after parachuting into France to act as a courier, a W.A.A.F. officer took charge of a large Maquis group after the capture of her commanding officer, reorganized it and, displaying remarkable qualities of tact, leadership and courage, contributed greatly to the success of many supply dropping operations and to the destruction of enemy forces. In another case a W.A.A.F. W/T operator landed and trained three French operators. This brave young woman's parachute stuck and opened only just in time. So she fell heavily and declared that she owed her life to bundles of paper francs which she was carrying wrapped round her like a cushion.

Thus fostered, the Resistance Movements of Europe grew. From Norway to Greece and from Brittany to Poland small armies sprang up, and as the days of 1944 grew longer as many as 170 aircraft a night ranged the length and breadth of France, guided, in some isolated places, by immense bonfires and, at other times and other places, by other methods. Patriot forces in the Balkans and in Central Europe were supplied from bases in the Mediterranean. Aircraft operating from this country dropped more than 160,000 parachute containers of arms and explosives, and 3,700 packages of specialized equipment. At least 15,000 tons of supplies were dropped from Great Britain

alone. Many splendid and experienced air crews were lost in these enterprises. Thousands of European patriots were savagely slain in reprisals by the Germans, but their devotion and the courage of Allied air crews were not in vain. The achievements of the F.F.I. and other citizen armies of Europe testified to the success and effectiveness of their enterprises.

The strategic bomber offensive, however, remained the principal role of the British and American Bomber Commands. The arm of Bomber Command reached across Europe from time to time and bombed targets in direct support of the redoubtable Red armies in their advance from the East. More generally, however, the effect of the British and American strategic bomber offensive was felt on every front—in the West, East and South. The 5th and 6th Panzer armies, when they started on their great offensive in the Ardennes in December, 1944, were only at half-strength in tanks and the shortage of tanks and other equipment and, most of all, of oil, hampered and enfeebled the power of Germany in every element and on every front.

It was a big decision of policy when the Prime Minister and the War Cabinet determined, in 1941, to launch this tremendous offensive. Vast resources had to be devoted to it. The factories and machine tools did not exist for the construction of the necessary number of bombers. Land had to be bought, foundations laid, factories planned and built, and labour recruited and trained, before the expansion could get into its stride. Our experience in bombing up to that time had brought home to us the extreme difficulty of the task which we were setting our crews. We knew that only a small proportion of our own bombs were hitting the right target, and that the same was true of the German air force in the blitz. With extraordinary courage and determination, our bomber crews were pioneering and blazing the trail for those who now carried on their work.

For four years the Allied Air Force was the only force from the West carrying the war to Germany. From Dunkirk to D Day they harried and pounded German war industry and transport. Had not the Luftwaffe been outfought in the air, hammered on its airfields and smashed in its factories, there could have been no invasion of Normandy in 1944. Every port in Southern England before D Day was packed with shipping for the invasion—a bomb-aimer's paradise—ships incomparably bigger and more numerous than the targets which Hitler's invasion preparations offered to our little bomber force in 1940. Yet not a bomb fell. From the

days of the first thousand-bomber attacks in the summer of 1942, the scale of attack mounted hugely. During the fifth year of the war—from September, 1943, to August, 1944—Bomber Command dropped a greater weight of bombs on Germany than in the four previous years put together. Even the fifth year's total was greatly surpassed in the six months which elapsed of the sixth year of war.

The combined offensive against German oil production began in April, 1944. By September, owing to the destruction wrought by Allied bombers and the capture of the Rumanian oil fields by our Russian allies, this production had been cut to about a quarter of the April figure. But oil targets were small, strongly defended and hard to hit. By November, after a period of bad weather, which prevented visual bombing, the Germans had succeeded, by incessant and desperate repair work, in raising it appreciably, but repeated attacks by the bombers, aided by the capture of the Polish refineries and the synthetic oil plants in Silesia by the Russians, struck the figure down again to the September level.

The effect of this lack of oil supplies was being felt in many ways. Many combat units of the German Army were not allowed to use oil except during actual operations. Movements of reserves and replacements were being held up. The movement of German surface shipping was severely restricted. German aircrews were not so good as they were because they could not spare the petrol for training. By March, 1945, the Allied Air Forces had reduced German oil production to such an extent that his available reserves were approaching exhaustion.

Allied air bombing was on such a colossal scale that Dr. Goebbels had to admit that "it could now hardly be borne." In the week ending 12th February, 1945, 16,000 tons of bombs were dropped by the Allied Air Forces. This rose to 23,000 tons the next week, to 41,000 the week after that. This swelling crescendo of destruction was engulfing oil plants, tank factories and the communications of the German armies on every front, as, from West, East and South, the Allied Armies surged forward into Germany to victory.

R.A.F. IN THE MEDITERRANEAN CAMPAIGN

The story of No. 205 Group, the only Royal Air Force heavy and medium bomber group in the Mediterranean, covers the whole field from Suez to beyond the Alps.

Primarily, it is the epic of the Wellington, Britain's "heavy" of the early years later designated as a "medium" bomber, the only

British bomber which fought throughout the war, of which, for one brief period, there were mine squadrons in the group. The Wellingtons were with Wavell and Longmore and Colishaw in the first Libyan campaign and they were still "there" when the Germans had long been pinned down in the Po Valley. Only a few weeks of the war remained, and the Nazis were disintegrating, when the last Wellingtons of No. 205 Group made their final sorties and the Liberators finally supplanted them.

The first Wellington squadrons to operate in the Middle East were reinforced in 1941, and in October of that year No. 205 Group was born. Thenceforward the Wellingtons of No. 205 Group with the Liberators and the Halifaxes coming in later, were the great night-striking force of the Allies in the Mediterranean. Although the Liberators finished the job, it was the gallant "Wimpeys" which will chiefly be remembered when the deeds of 205

Group are recalled.

The Benghazi "mail run" became famous, but the hardest nut that No. 205 Group tackled in Africa was Tobruk, Rommel's supply port and chief target of the crews of 1942. For three months the Group turned on every available aircraft in order to check supplies bound for the Afrika Korps, and so intensive was their effort that during a period of 92 nights the "Wimpeys" attacked Tobruk 80 times. Tobruk was a viciously defended target. Many good crews made their last sorties in attacking it, but all through the anxious summer of 1942 the Wellingtons carried on.

The first birthday of the Group was celebrated by a maximum effort at El Alamein. Double sorties were flown and the crews looked down on Montgomery's first great barrage, smashing vehicles and guns close behind Rommel's front line. Explosions of ammunition rocked the Wellington bombing from

6.000 feet.

From El Alamein the Group moved forward in the wake of the 8th Army until the final African show-down at Cap Bon. Next day they received the dramatic signal "No further operations in connection with this campaign."

Then began the new phase—attacking from Africa targets on the European mainland—which lasted until the end of the year, when

the Group crossed "Mare Nostrum."

Early in 1944 the Balkan campaign began. Throughout the severe winter months the Wellingtons bombed targets in the capitals of the enemy Balkan states—Sofia, Budapest, Bucharest, and the famous Iron Gate Canal. They helped to hold the Anzio beach-head. They

plastered the Western Italy supply ports—San Stefano, Piombino and Leghorn—which became known as the "Three Sisters."

Gradually about this time the Liberators began to take a big share in the activities of No. 205 Group, and they and the Wellingtons had a new and tremendously successful role. Huge volumes of German supplies and ammunition were being carried on the barges of the Danube—the biggest waterway of Europe—and the Liberators and Wellingtons, now becoming minelayers, were given the job of checking the flow. Nearly 1,400 mines were laid in the river, over 100 ships were sunk, and the traffic was at times reduced to a trickle.

Liberator squadrons of the South African Air Force who joined the Group took a full share in these operations during the last moonlight periods when they were going on, and in

all later operations.

Another operation which proved of vital significance in the whole picture of the war was the bombing of the Rumanian oilfields. Both the oil from Rumania and the Danube barges in which it was carried were of immense importance to the Germans. No. 205 Group stopped much of the river traffic and, as the night counterpart to the daylight attacks of the 15th U.S.A.A.F., they helped to destroy the oilfields themselves. One of their most notable attacks was on the refineries of the Steaua Romana Company at Campina, twenty miles north-west of Ploesti itself.

Another feat of the Group's Liberators was the dropping of supplies to the Polish patriots in Warsaw, in which No. 205 Group were concerned in common with the R.A.F. and Polish Halifaxes of the Balkan Air Force. The round trip of 1,750 miles from Italy to Warsaw meant twelve hours' flying time over territory mostly German-occupied. Heavy losses were necessarily entailed, but in spite of all hazards on no occasion did at least a portion of the vital supplies fail to be delivered on time. The C.-in-C. of the Poles in Warsaw wrote: "The exertions of your Air Force enabled us to continue fighting. Warsaw under arms send the gallant airmen their word of thanks and appreciation. We bow our heads to those who have fallen."

Later, thousands of tons of supplies were dropped to the Yugoslavs and just before Christmas, 1944, when the situation in Greece was critical, Liberators and Wellingtons—the "Wimpeys" were there again—rushed British troops from Italy to Athens. Not a man or round of ammunition was lost.

Early spring of 1945 arrived and the Wel-

lingtons retired, though not before they had taken part in the smashing of German communications in Italy, Yugoslavia and Austria, as part and parcel of the Allies' last air blows at the German-held railroads.

Squadrons of No. 205 Group, starting their Mediterranean war near Suez in 1940, were still hammering the enemy when the end came. The original units had been there between four and five years.

To the end the Desert Air Force remained the terror of the German armies.

The Desert Air Force, spearhead of the 8th Army from Egypt to the Alps and the terror of the German troops, created for itself a special niche in Tactical Air Force achievement. Its successful tactics in the push from El Alamein, with the brilliant exploitation of the famous "Tedder Carpet," set the pattern for air-ground co-ordination on the Western Front.

Since then D.A.F. had helped the 8th Army to hound the enemy from the toe of Italy to the rout in the foothills of the Alps. Its reputation sparkles with colourful incidents. D.A.F.'s spearhead work constantly demonstrated how a stubborn enemy could be broken by the skilful applications of air-ground co-ordination. At the end of the battle in North Africa, the Spitfire and Kittyhawk wings (Nos. 244 and 239 respectively) which fought from El Alamein were augmented by Spitfire wings that came through from Algiers with the 1st Army.

This seasoned force crossed to Malta and began to chase the Luftwaffe from the Sicilian skies. With the landings in Sicily No. 244 Wing's Spitfires were the first Allied aircraft to operate from an airfield in Fascist Europe. But there was little sign of the Luftwaffe for several weeks. These skilled fighter pilots met few enemy aircraft. Then, towards the end of the campaign, one squadron made a surprise attack on twenty-one lumbering three-engined transport off the north-east coast of Sicily and shot them all down in ten minutes.

The squadron took heavy toll of road transport and later braved the flak alley of Messina Straits to hamper the German withdrawal to Italy. When the landings at Reggio and Salerno took place, the Desert Air Force provided the air umbrella. The Kittyhawks were the first D.A.F. aircraft to fight from an airfield in the heel of Italy. They arrived before the army in that district and a great supply effort was made by Dakotas to keep them flying. Petrol, bombs, ammunition and food had to be flown in and over 100 transports landed

daily for more than a week. This effort helped to save the sorely pressed troops. The 57th and 79th U.S.A.A.F. Fighter Groups, flying Wahawks, fought with D.A.F. The 57th had been with them in the Western Desert, one of the first practical examples of Anglo-American air effort.

Spitfires from Sicily fought over the Salerno beach-head and maintained standing patrols until an airfield was established. Air combats were not so frequent as in the African campaign, but our fighters took their toll when they had the chance. The Anzio days were as anxious for Desert Air Force as for the men on the ground. Squadrons kept standing patrols as long as possible over that narrow line where so many men died. Then a landing-strip was cleared. In turn, Spitfire squadrons flew from the south to land before dusk and relieved the squadrons that had been on duty all day, and, after spending an uneasy night disturbed by shelling, took off at first light to provide an umbrella for the landing of men and supplies.

With the break-out from Anzio and the drive on Cassino the Desert Air Force began to harry enemy road transport on a great scale. In May, 1944, No. 244 Wing shot down its 400th aircraft of the war. The wings covered the race to Rome and farther north.

Gradually changes were made. Two wings went to Corsica to cover the landings in the south of France, and ultimately became the first R.A.F. squadrons to land west of Cannes.

No. 244 Wing, converted to fighter-bombers, achieved further success in destroying road transport. With the switch of the 8th Army to the east coast for the drive on the Gothic Line in August, 1944, the Kitty-bombers, strengthened by Mustangs, went with it and played their part in the assault.

Desert Air Force squadrons settled down to the dreary static winter warfare of 1944-45 but still hammered away. Then, with the start of the offensive in April, the Spitfires, Kitty-bombers, Mustangs, Marauders and American-piloted Thunderbolts and night-flying Bostons and Baltimores, made an all-out effort. As the enemy reeled under the air and land blows, D.A.F. smashed strong-points and transport throughout the eastern Po Valley. Its aircraft flew 21,000 sorties in April and put out of action nearly 5,000 vehicles of all kinds. In the final two days of April alone more than 1,000 motor vehicles seeking to escape to the north were destroyed by the Desert veterans.

R.A.F. FORCE THAT WAS TITO'S "AIR ARM"

Though the youngest Air Command in the

Mediterranean, Balkan Air Force has nevertheless a fine story to tell. It was brought into being in June, 1944, when it became apparent that the forces under Marshal Tito could greatly benefit from air aid.

Its triple work of attack, supply and rescue in remote fields and forests beyond the Dinaric Alps soon gathered almost the same romantic prestige that attached to the Partisans themselves. R.A.F. officers and airmen were dropped by parachute behind the enemy lines and with Yugoslav help selected secret airstrips in which unarmed transport could land.

Supplies, the most modern types of weapons, food, fuel, clothes and ammunition began to pour in and, equally important, the empty transports carried out loads of wounded who would otherwise have died and who in any case encumbered the Partisan forces.

In all, B.A.F. aircraft rescued almost 20,000 men, women and children and brought them safely to Italy. It was one of the finest human

tasks of the war.

For its offensive role, B.A.F. used Marauder and Baltimore bombers, whose main targets were marshalling yards and gun positions; rocket-firing Beaufighters and Hurricanes to attack shipping, rolling stock and strong-points, and Mustangs, Spitfires, Airacobras and Macchis, whose chief function was, as fighter and fighter-bombers, attacking road and rail transport.

B.A.F. had not only harried the enemy forces in Yugoslavia and Albania, but had reached

out to south-east Austria. It was also called upon to set up an air headquarters in Greece, on which fell the task of co-operating with the British land forces there.

Its most spectacular offensive action was when over 800 vehicles were destroyed by its fighters as the German 21st Mountain Corps retreated from the "Podgorica pocket," as it was called. Italian Air Force pilots, flying Spitfires, Macchis and Airacobras, as part of B.A.F., co-operated in this mass destruction.

Another high-light was when rocket-firing Beaufighters, in conjunction with naval forces, knocked out the coastal gun on Lussin Island in the northern Adriatic. After this, our ship-

ping steamed past unchallenged.

The supply missions flown by B.A.F. to Yugoslavia, Czechoslovakia, Poland, Austria, Northern Italy, Bulgaria and Greece were as important as the offensive missions, or even more, though little so far has been revealed about them.

By air, 22,299 gross tons of ammunition, food, clothing and medical supplies were taken to the Partisan forces in these countries, being dropped by parachute or landed on the secret airfields behind the enemy lines. Here, again, the main effort was to Yugoslavia.

For their work the B.A.F. had Halifaxes and Dakotas, and often enlisted the aid of other R.A.F. and American bomber formations for big "drops." Balkan Air Force has a proud record of work, carried out with courage and

careful planning.

Air War Statistics

NEARLY 8.000 DESTROYED BY HOME COMMANDS

R.A.F. TOLL OF AXIS AIRCRAFT

THE Air Ministry issued the following statement on the number of enemy aircraft destroyed by the R.A.F. and R.A.F. losses from the beginning of the war up to 28th April this year:

Home-Based Commands Axis aircraft destroyed by R.A.F.: By Bomber Command 759 By Fighter Command in defensive and offensive operations ... 6,977 By Coastal Command 175 Total 7,911

R.A.F. losses:

Bomber Command Fighter Command in offensive and	7,997
	2,998 454
Total	11,449

AMERICAN OPERATIONS

The following are statistics of operations against Germany by American Air Forces and units from the beginning of those operations until mid-April:

8th Air Force

Tonnage.—694,938 (530,758 on Germany proper).

Sorties.—332,056 bombers; 260,006 fighters. Claims.—Fighters: 5,230 air, 4,207 ground. Bombers: 6,001 air, 3,073 ground (destroyed or damaged).

Losses.—4,161 bombers, 2,016 fighters.

15th Air Force

Tonnage.—303,842.
Sorties.—148,955 bombers, 87,732 fighters.
Claims.—3,949 air, 2,342 ground.
Losses.—2,363 bombers, 1,001 fighters.

9th Air Force

Tonnage.—214,802.
Sorties.—379,698.
Claims.—2,277 air, 2,058 ground.
Losses.—771 bombers, 2,124 fighters.
(No distinction available between bombers and fighters.)

12th Air Force

Tonnage.—215,200.

Sorties.—116,710 bombers, 268,740 fighters.

Claims.—2,913 air, 220 ground.

Losses.—767 bombers, 1,771 fighters.

1st T.A.F. (American Component)
Tormage.—24,813.
Sorties.—5,291 bombers, 43,476 fighters.
Claims.—231 air, 437 ground.
Losses.—39 bombers, 253 fighters.

9th Troop Carrier Command

183,887 tons freight transported, 19,354,083 gallons petrol, 200,000 patients evacuated, 73,500 prisoners of war evacuated, 61,712 troops carried on movements of units; 261,449 troops carried on airborne operations, 9,710 aircraft flown on major operations, 3,696 gliders towed into battle.

Bombs on Germany

British and U.S. Attacks

During the war the R.A.F. dropped 986,000 tons of bombs on German and German occu-

dropped 891,500 tons.

Sir Archibald Sinclair gave the following details in a Parliamentary answer circulated recently:

pied territory, and the United States Air Force

R.A.F. (Bomber Command and R.A.F. element of the Allied Air Force in Italy): 1940, 13,000 tons; 1941, 32,000; 1942, 45,500; 1943, 157,500; 1944, 547,000; 1945, 191,000. Total: 986,000 tons.

United States Army Air Force (8th Air Force based in England and 15th Air Force based in Italy): 1942, 1,500 tons; 1943, 48,500; 1944, 578,500; 1945, 263,000. Total: 891,500 tons.

(The foregoing figures are in long tons. They do not include the weight of bombs dropped by the Tactical Air Forces.)

AIR RAID CASUALTIES

The total number of casualties in the United Kingdom due to enemy air action (aircraft), flying-bombs and rockets) is 145,790. Of these, 58,211 were killed and 87,779 injured and detained in hospital.

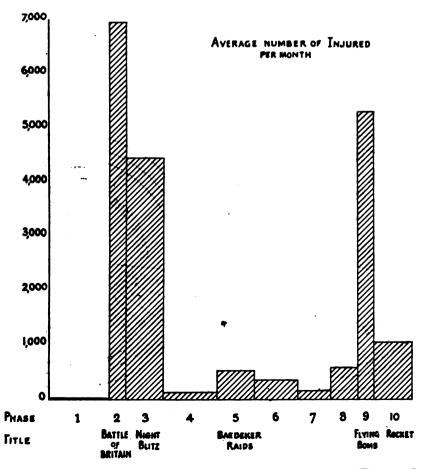
The corresponding figures for the First World War, 1914-18, were: total casualties, 4,830, of which 1.414 were killed and 3.416 injured. The casualties in this Second World War are only therefore just over thirty times greater but with a far greater percentage of killed to injured. But the figures in this respect may not be comparable as the figures for World War II only include the injured detained in hospital, whereas all classes of injured are believed included in those of World War I. However, the figures are nevertheless interesting from many other aspects. The most striking surely is that the total casualties is no more than thirty times greater seeing that the total weight of bombs dropped is at least 300 times greater in World War II. A total of only 270 tons was dropped in World War I.

The casualties during the Battle of Britain at 14,363 killed and 20,871 injured, a total of 35,234 for the three months, easily come out highest of the whole war and averaged 4,788 killed, 20,871 injured per month. The next worst period was the night blitz, during the seven months of which the casualties totalled 57,909, and an average of killed 3,810 and injured 4,462. It was during these ten months of the war, out of a total of 67 months to end of March, 1945, that about 65 per cent. of the casualties occurred. Indicative of the potentialities of the flying bomb and what their effect might have been had this form of attack approached what had been planned for it are to be gauged from the figures of the three months June-August, 1944, when the total number of casualties were 21,410. This total is the more striking when compared with the figure of 35,234 for the three months of the Battle of Britain.

The total number of rockets reaching this country was 1,050. Total casualties were 2,754 killed and 6,523 seriously injured.

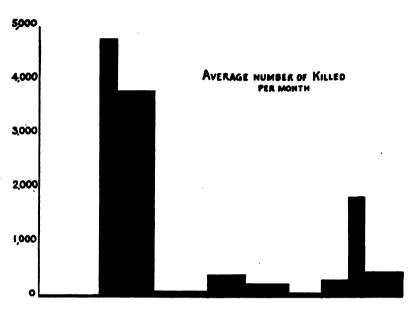
AIR RAID CASUALTIES

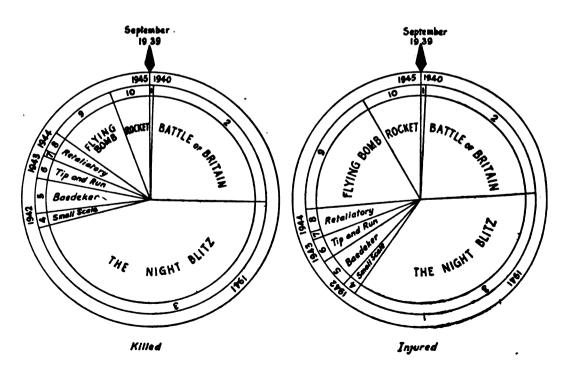
	No. of Mihs.	Killed	Av'ge M'thly	In- jured	Av'ge M'thly			Running Totals	
1. Sept. 1989–July 1940		810	28			709	64	709	Dania of Dania
2. Aug. 1940–Oct. 1940	8	14,363		20,871	6,957	85,284	11,744	85,948	Battle of Britain.
8. Nov. 1940-May 1941	7	26,673		81,236	4,462	57,909	8,272	98,852	Night "Blitz."
4. June 1941–Mar. 1942	10	1,168	116	1,896	139	2,559	256	96,411	Intermittent raids— small scale.
5. April 1942–Oct. 1942	7	2,887	412	8,748	585	6,685	948	108,046	" Baedeker " Raids, April-June.
6. Nov. 1942-June 1948	8	1,968	245	2,754	844	4,717	590	107.768	"Tip and Run" raids
7. July-Dec. 1948	6	527	88	947	158	1,474	246	109,287	Retaliatory and pro- paganda raids
8. JanMay 1944	5	1,561	812	2.956	591	4,517	904	118.754	Do. Do.
9. June-Aug. 1944	8	5,479		15,981	5,810	21,410	7,187	185,164	Flying-bomb attacks
10. Sept. 1944 Mar. 1945	7	8,285	470	7,841	1,049	10,626	1,518	145,790	Mostly rockets (see introductory notes).
Grand Totals	67	58,211	870	87,779	1,810	145,790	2,176		,



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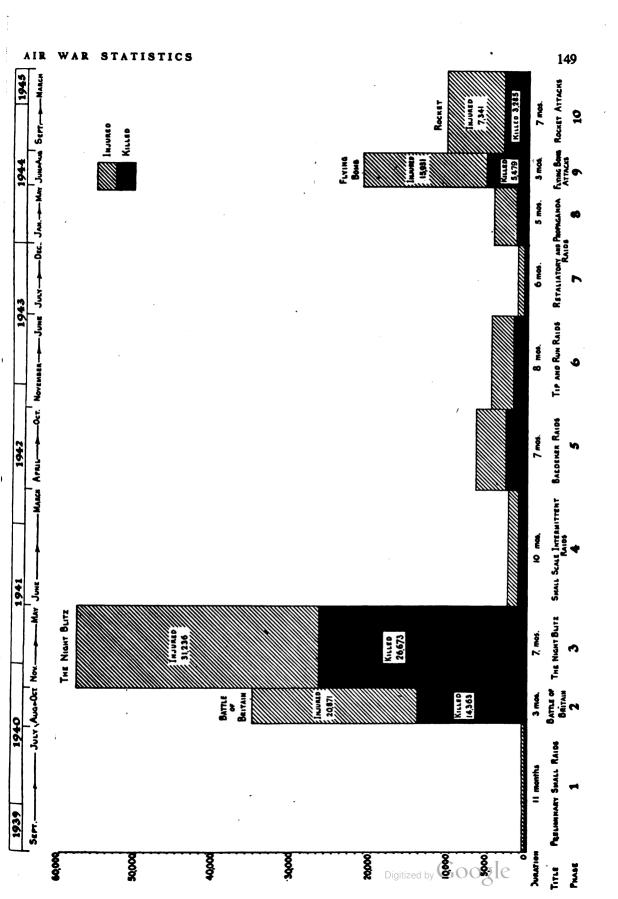
1939	1940	1941	1942	1943	1944 1945	5
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DIAGRAMS TO SHOW THE RELATIVE PROPORTIONS OF CASUALTIES DURING THE TEN PHAGES

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Strategic Bombing

A nagreed statement issued recently on behalf of the Anglo-American Air Forces in Europe gave this summary of the principal results achieved by strategic bombing:—

Air superiority was won before the invasion of Normandy and was maintained in ever-increasing measure throughout the successive stages of the Battle of France, the crossing of the Rhine, and the Battle of Germany. During the past few weeks a big proportion of the Luftwaffe which had survived earlier battles was destroyed wholesale on the ground.

OIL OUTPUT SMASHED

In spite of a vigorous effort by the enemy to repair bomb-damaged plants, German oil supplies were steadily reduced in a twelve-month period to a point where their total oil production was only 7½ per cent. the output in April, 1944, and petrol production only 3½ per cent. This seriously affected the German war potential on all fronts—land, sea and air—so that neither his air force nor his army was mobile.

At various stages the strategic air forces joined the tactical air forces in isolating the battlefields. So successful was this offensive that the enemy could not move in his reinforcements as he planned, and any movement at all was accomplished with the utmost delay and confusion. On several occasions this interdiction by all air forces was followed by an encirclement of the enemy, and he was cut to pieces by strafing and bombing of the pockets or forced to surrender in large force. This occurred at Falaise, along the Seine, along the Loire, and in the Ruhr.

At various stages of the campaign, by dropping a more concentrated weight of explosive than ever before used in warfare, the heavy bombers paved the way for a successful ground offensive. This was the case at Caen, St. Lô, the Roer, and the Rhine.

The special weapons developed by the enemy, notably the V-bombs and the jet-propelled aeroplane, were reduced in effectiveness by our bombing of component factories, experimental stations, V-bomb launching sites, and airfields.

When Germany invaded Russia in 1941 the German Army had the benefit of 3,300 aircraft—56 per cent. of the whole of the Luftwaffe—and a high proportion of these were

bombers and dive-bombers. Because of the demands for defence of the Reich against the Anglo-American air attack, by the end of 1943 the German Army had only 18 per cent. of the air force for its support, including only 350 fighters along the 2,000 miles of the eastern front. The needs of home defence also kept inside Germany many fighters which would otherwise have opposed our Normandy landings. It was not until early in 1945 that the Luftwaffe put its single-engined fighters into the field in support of the Wehrmacht once more, and by that time it was hopelessly outnumbered and was short of fuel.

Allied air power, by smashing railway and other transport targets, also baulked the German defensive plan to meet our invasion in the west. The enemy planned to bring reserve divisions to the battlefield at the rate of forty-eight trains a day, but bombing cut this to six trains a day.

When all the synthetic oil plants in the Ruhr had been put out of action, coking and tar distillation plants which produced benzol as a byproduct were bombed, and subsequently petrol, oil, and lubricating oil depots were systematically attacked so as to drain the enemy's supplies "to the last dregs."

Allied bombers in Italy co-operated in the assault on the enemy's oil by attacking refineries and other plant in occupied territory. A series of attacks on Ploesti reduced output from 155,700 tons a month in March, 1944, to 15,400 tons in August, when it was captured by the Red Army. By April, 1945, so little oil was being produced in Germany that it could not economically be distributed; it would have taken too much oil to move the oil where it was needed. By mid-April, 1945, the output of German oil had been cut to 7½ per cent. and of motor and aviation fuels to 2 per cent., and there was no plant within the Reich capable of any substantial output.

The enemy placed great store by the jetpropelled fighter, which it was hoped would turn the tide for the Luftwaffe. But it never got into action in big numbers, because components and assembly factories were bombed and its experimental grounds and airfields made unusable. In eight days last month over 2,000 German fighters, which had taken refuge on temporary bases, were destroyed on the ground by Allied fighters.

A Single Task—A Single Aim

(From "Day and Night." The story of U.S. Eighth Air Force and R.A.F. team work.)

JOINT MISSION

. . It is one thing to lay out the blueprint of future strategy and another to fight through the thousand unforeseen problems of a global war to full-scale operations. The fight began in earnest for the Eighth in the Fall of 1942, when Forts and Libs tested out their strength in their small missions over France and the Low Countries. At the Casablanca Conference in January, 1943, the work of Eighth Bomber Command was carefully considered. Although the value of daylight precision bombing was doubted by some authorities, the Eighth had achieved sufficient results to convince the Combined Chiefs of Staff that the Eighth would provide a powerful daylight partner to the R.A.F's night assaults. They defined for the two bomber forces a joint mission—" the progressive destruction and dislocation of the German military, industrial and economic system and the undermining of the morale of the German people to the point where their capacity for armed resistance is fatally weakened." By "fatally weakened" was meant, sufficiently weakened to permit final combined operations on the Continent. It was made clear at Casablanca that the joint strategic bombing of the two forces was to be a major part of the Allied war plan in the European theatre in 1943.

To-day the heavies of the Eighth are protected by a great screen of their own fighter planes from start to finish of their long missions. At the beginning of their operations, and for more than a year afterwards, they had to depend almost entirely on R.A.F. fighter escort. Spitfires escorted the bombers at the beginning and end of their missions. But the range of the fighters was very limited, as continuous fighter escort was not a part of the R.A.F. night bombing plan. This lack was not so serious for the first months, but with the growing weight of the daylight missions over the Reich in March the Luftwaffe began to increase its fighter attacks upon the heavies. Casualties mounted and large-scale air battles became more frequent. It was this growing strength of the German Air Force which was the greatest concern not only of the Eighth Bomber crews, but of the Allied military chiefs in Washington and London. The North African invasion had made it clear that continuous air

superiority would be essential for a successful invasion of the Continent.

NUMBER ONE JOB

There were only two ways in which this could be done—by destroying existing enemy planes, and by crippling their aircraft industry. To this task the R.A.F. and the Eighth turned their attention, though the heaviest responsibility fell on the daylight bombers. Following Casablanca, and as the Eighth swung into full stride, a combined Bomber Offensive Plan guided the two Air Forces in the priority and allocation of targets. The R.A.F. struck at the big industrial areas, with their concentrated plants, centres of population and industrial manpower, and sources of transport, lighting and power facilities. The Eighth went after the key industrial plants which were usually placed on the fringes of cities or in the countryside, and therefore often escaped the R.A.F.'s area saturation bombing.

From July, 1943, until shortly before D Day, the Eighth, helped by the Fifteenth, sought out the aircraft assembly plants, engine plants, airframe plants, and the ball-bearing factories, bottleneck in aircraft manufacture. R.A.F. Bomber Command pounded adjoining population centres. The joint assault crippled production and forced the Germans to develop their aircraft manufacture away from the cities, and in smaller units.

When oil became a top priority target in the spring of last year, Eighth, Fifteenth and R.A.F. airmen together hammered at the nerve centres of production and supply. The R.A.F. attacked the synthetic plants situated in the Ruhr, and the Eighth and Fifteenth hit the oil resources further East and South. Together they reduced fuel and lubricant production by more than half. During the invasion days R.A.F. Bomber Command, as well as the Eighth, swung in with the Ninth on the vital tactical tasks to protect our ground and sea forces and to immobilize and whittle down the enemy's supplies and communication lines. While the Eighth hit bridges and fortifications, often within a few hundred yards of our own troops, the R.A.F. heavies pounded forts, marshalling yards, and other targets in more open

territory. All through the land operations both forces have hammered at strategic and tactical targets alike, following the pattern of priorities laid down by the Chiefs of Staff and allotted according to the special qualifications of each.

TEAMWORK ON TARGETS

There has only been one large-scale combined operation, when the Eighth and the R.A.F. bombers actually flew together to attack the same target. Last August a thousand U.S. and eight hundred British bombers attacked enemy airfields together. Bomber Command is developing increasing numbers of units for day flying, just as the Eighth has been training night bombers, and the two Commands have provided each other with invaluable assistance in such training. But the main pattern of the strategic day and night bombing partnership outlined at Casablanca is more firmly established now than ever before.

In the early months of the Eighth's operations the inevitable sudden changes of plans in both Air Forces frequently led to some confusion. There were too many last-minute requests for attacks on targets, fighter cover, diversionary sweeps and the like. To coordinate activities and provide joint plans for penetration to the targets over the Reich, a R.A.F.-Eighth Air Force Combined Operational Planning Committee, with British and American representatives of bomber and fighter components, was set up in the summer of 1943. The committee studied the available information collected by both Commands, recommended targets, and advised on the best methods of using their resources to hit the chosen targets hardest. This committee is but one example of the joint planning needed to co-ordinate the working of the two great forces.

The machinery of co-operation between the Eighth and the R.A.F. begins above the heads of both. The Combined Chiefs of Staff in Washington and London study the data on both the enemy's and our own situations and prepare the broad outline of target priorities and operational strategy. The U.S. Strategic Air Forces in Europe Headquarters and the British Air Ministry interpret the missions to be accomplished by respective air forces in this theatre. Then it is up to the striking forces of the R.A.F. and Eighth to accomplish the knocking out of specific targets in the order of their current priority. Target selection committees on which both Air Forces are represented, are continually sifting intelligence data from photos and reports to determine which plants, depots or railyards are most valuable to the enemy, and therefore the most urgent targets. No target is ever attacked by either Force without the other first being informed of the proposal.

POOLING THE PICS

There is no field in which the sharing of information and resources is greater than in photo reconnaissance. The British and Americans fly separately to take pictures, and the processing is done at different laboratories, but from then on R.A.F. and Eighth Air Force personnel work together on photo interpretation and the handling of the data secured. American officers may work on British photos and vice versa. There are no secrets between the two reconnaissance units. The vast scale U.S. Recon Wing adopted many British ideas from its opposite number in the R.A.F. and uses much British equipment and material. In return, American production methods and facilities have enabled the Eighth to assist the R.A.F. in overcoming technical problems in the reconnaissance field. The R.A.F. use our Forts for special recon jobs, and the Eighth use Spitfires in addition to P-38's and Mosquitos.

One of the most remarkable features of Allied co-operation is the pooling of weather information. The British meteorological teleprinter network serves R.A.F. and Eighth air bases alike, and receives data from the many facilities of both Air Forces as well as from many other more distant sources. The routine weather reconnaissance runs made by Eighth and R.A.F. planes have been carefully coordinated. Joint codes and procedures have been worked out so that operational head-quarters can quickly obtain weather forecasts for special targets in addition to the regular teleprinter service.

MUSTANG IS A MODEL

The Mustang, one of the most successful planes used by both Air Forces, well illustrates how successful teamwork has been in the technical sphere. Nearly two years before Pearl Harbour the R.A.F. made known through British Government technical and trade representatives its needs for a certain type of pursuit plane. An American firm, North American, went to work and designed, produced, tested, redesigned and handed over the first production model to the R.A.F. a month before Pearl Harbour. Our own General Doolittle, incidentally, had a part in testing an early model and suggesting modifications. In the early spring, Mustangs went into action on low-level photo recon missions. It was not until the Dieppe



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LANDING GROUND AT KAIMERI, NEW GUINEA

CANTON



raid in August, 1942, that the Mustangs proved themselves as excellent low-level fighters.

Impressed by British experiments, the North American engineers began equipping the P-51's with 20 mm. cannon for the U.S. forces in North Africa and soon sensational reports of their ground strafing came back. The cannon installation was so successful that the R.A.F. adopted the design principles in their own British aircraft. Soon the R.A.F. Mustangs over the Continent became famous as "train busters." New models with modifications were produced for the U.S. Army Air Forces and production was completed in time for the Mustang to play an important part in the reduction of Pantelleria.

In the late spring of 1943 the British supercharged Rolls-Royce Merlin engine was substituted for the original power unit on the American production lines and this new Mustang was delivered to the Eighth in November, 1943, for its biggest job—escort duty with the heavies high over the German territory. Soon, with the Tunderbolts, the P-51's were able to relieve the medium bombers of their role of hitting enemy fighter airfields and of running diversions to protect the Forts and Libs, and the Bostons and Marauders were able to assist the R.A.F. in attacking the flying-bomb and rocket sites which presented a serious menace to British cities.

TEAMWORK TELLS

The immediate objective of the joint mission laid down for the two Air Forces at Casablanca has been accomplished. The Nazi war machine was hammered by the Eighth and the R.A.F., as well as by the Fifteenth, until it was unable to prevent the Allies establishing their forces in France. Together the two great strategic Air Forces assisted Allied tactical air power in supporting the great advance of the ground forces to the borders of the Reich. To these achievements must be added the relief which the Eighth-R.A.F. air assault afforded the Russian and Mediterranean battlefronts. The Germans were forced to employ an estimated 1,700,000 of their manpower on ground defence against the air attacks from the West; during 1943 they had to increase their fighter strength on the Western approaches to 60 per cent of their total resources, with an accompanying loss of air power on the other fronts.

It is impossible to estimate how much time or how many lives have been saved by the teamwork of the men and women of the two Air Forces on these jobs. It is equally impossible to estimate which of the two has made the greater contribution. The important point is that together they have accomplished what could not have been done separately.

The Test Case of France

BY FLIGHT-LIEUTENANT R. F. DELDERFIELD

INTRODUCTORY

WHEN the Allied battle-line pushed eastward to the confines of Germany, leaving free those areas in France and Belgium which had been bombing targets for British and American airmen, a small party of Royal Air Force officers, carrying cameras, cine-cameras and notebooks, set off for France in a flight of light Auster aircraft, normally used by the British for artillery observation.

Their assignment was to visit fifty places which had been the chief bombing targets for the R.A.F. heavy bombers during the years of occupation. They were to record in moving pictures, still pictures and text, the results of heavy bombing by the R.A.F. They were ordered to move fast, so that they might observe the targets while they still remained much as the Germans had left them, before the French and Bel-

gians had time to tidy the mess. This is the story of the officer who carried the notebooks.

A man who looks here for conclusions on the power of heavy bombing will not find them. There were no conclusions to be drawn from the bombing of Guernica, of Coventry, of London; one could say only that, at that stage of the development of bombing, such and such were the observed results. That was the case also in France and Belgium; there was only an interim report to make.

There was heavy bombing by the Allied air forces in those two countries, but it was not true strategic bombing. Here was no attempt to knock out a country's war power at its source, but only an essay, by bombing certain kinds of targets in certain ways, to achieve set and limi-

ted results—to achieve, for example, the dis-

ruption of the transport system.

So, although 6,000 miles were flown on this tour of bombing targets—twenty-eight railway centres, eight V-weapon sites, five ammunition dumps and shell-filling centres, four powder factories, four oil depots and one military depot—I still cannot answer the fundamental questions about heavy bombing. I cannot even claim to have seen all the bombing of limited objectives in France and Belgium, for I visited only those targets allotted to the R.A.F. Bomber Command. Side by side with the British effort went the powerful bombing offensive of the 8th United States Air Force, and of that, in this article, I give no account.

Yet, with those limitations, there are some questions I can answer now. I can say what effect the heavy bombing of the R.A.F. had on the rail and road system which the Germans were using to supply and maintain their forces in Western Europe. I can describe from my own observation what is the effect of a concentrated bombing raid on a large factory. I can report from interviews with Frenchmen (who have sustained heavier bombing than any nation in the world save the Germans, who have yet to be questioned) what it is like to crouch in some shelter beneath the force of a heavy bombing raid by four-engined aircraft. And perhaps from these reports, from chance phrases spoken as matters-of-fact by men telling of recent horror, there may come truths about bombing more revealing than the stereoscopic searching of photographs, or the compilation of an intelligence summary.

There lives, for example, on a small farm on the Loire near Saumur, within a few hundred yards of the southern entrance to a main-line railway tunnel, a fourteen-year-old girl named Jeanne. She looks no more than ten, but that is because of under-nourishment, and perhaps because of anxiety for her father, who was a prisoner of war in Germany. Jeanne keeps a diary, in the most careful copper-plate writing. Each night she makes her commonplace entries: "Rose 5.30. Fed the rabbits. Rained all day

1944, Jeanne wrote in her diary (in rough translation): "Last night the British bombed our tunnel. There were a lot of bangs. They made a

big hole. No trains came."

There is something to be learned of the military employment of heavy bombers from that entry in Jeanne's diary, written in a fair hand which even on that day did not falter. For on the night of 8th/9th June a force of thirty-one Halifax bombers of R.A.F. Bomber Command

had been given the southern entrance of Jeanne's tunnel on the main line from the Loire to south-western France as their target. The object of the raid was to prevent German reinforcements from moving into the battle area. The Halifaxes dropped 130 tons of bombs, punched a hole in the cliff above the tunnel mouth and sealed that end of the shaft. That was some seventy hours after the D Day landings in Normandy. "No trains came."

The fifty R.A.F. targets which I was assigned to cover were of four main kinds, were attacked with four main objects. By far the greatest number of them were transport targets, struck with the object of paralysing German movement of reinforcements and supply. The second kind were sites connected with the V-weapon offensive against England; the third were sources of ammunition for the German armies, and the fourth were oil dumps. These targets were attacked for the most part during the spring and summer of 1944. They formed Bomber Command's contribution to the air campaign that preceded D Day.

Of the results of heavy bombing of a transport system there is now no doubt. The transport system is shattered, much of the rolling stock is destroyed, many troops are killed on their journey. The attacks are as effective at night, when bombers use the pathfinder technique, as during the day. Night precision bombing is as sure and exact as any in the world.

Take for example the railway marshalling yards at Vaires, near Paris, at nine o'clock on the night of 29th/30th March, 1944. At that hour the Sous-chef de Gare was observing without much interest the arrival at a siding of a long train packed with German troops. The train was eastbound, and so was presumably taking reinforcements from the then quiescent western marches of Europe to the more threatening Russian front. It pulled into the siding in order to change engines for the long haul to the east. Standing nearby was an ammunition train laden with 800 tons of explosives.

The Frenchman observed all these things with small interest—the usual routine of a marshalling yard, busier perhaps than on most nights. But at that moment the air-raid sirens howled. The Sous-chef took the deepest shelter he could find; there were unpleasant reports passing along the railways of what had recently happened at Trappes. Almost immediately the first bombs fell.

The railwayman's description of the following twenty minutes is better emphasized by his gestures, by the look of memory in his eyes,

than by his actual words. He thought, as he lay in his shelter—as the earth around him jumped with each explosion—that this must be the heaviest air raid of the war. It was, as a matter of fact, something of a light raid. Eighty Lancasters and Halifaxes of Bomber Command, just about one-twelfth of the average 1,000-bomber raid on a German target, were dropping 310 tons of bombs. Towards the end there was a prolonged roar, marking a direct hit on the ammunition train, which blew up. Then all sank into quietness.

When the Sous-chef came out of his shelter he had a job to cross his marshalling yard. There were acres of smouldering rubble. Over there by the main buildings, or what had been the main buildings, men had lit flares, and by their light, and the light of the fires, teams of stretcher-bearers were carrying German dead and wounded in processions to the ambulances which drove up and away again, up and away again. By dawn they were still clearing the casualties. The troop train that had drawn up at Vaires to change engines had lost 1,500 men from those reinforcements for the Russian front. That was an example of night precision bombing.

There were many Vaires. Vivid and gripping were the stories of French railwaymen who lived through a night-precision attack. M. Grenier, an Inspector of Orleans, was present one warm night in May when 620 tons of bombs crashed on the goods yards of Les Oubrais. He watched a Reichbound train crammed with German troops pull into the station and jolt to a standstill, just as the first R.A.F. markers released their flares. Standing at the entrance of a semi-underground station block, between permanent-way and stationapproach, he was overwhelmed by the onrush of terrified men, clawing their way across the intervening tracks to seek refuge in the sunken stone passage. There was an inevitable jam. First arrivals stayed under cover, the centre and rear of the swarm milled round the narrow entrance and the bombs caught them in the open, hurling screaming men over the coaches

Grenier said 550 Germans died at that spot. They worked all night combing the burning debris for those that still lived. In November the shattered train was still in the siding, its carriage doors hanging open to witness the passengers' frenzied dash for cover.

and sealing the bottleneck with mutilated dead.

Up at Courtrai they told me the story of the missing engine-driver. His timely truancy from the footplate of a troop-train cost the enemy 250 killed and many wounded on the night of

10th May. When the air-raid alarm began to wail a German commandant barked "Get that train out of the station!" But the packed coaches remained and the soldiers, under orders to stay where they were, merely cocked apprehensive ears toward the first explosions down towards the goods-yard. German officials organized a despairing search for a substitute driver, but none was found. Within a very few moments a driver was unnecessary, what was needed were ambulance-men, stretchers, first-aid dressings and morphia. Hundreds of shrieking men grovelled in the churned-up earth beside the tracks. The troop-train had crumpled up under a couple of direct hits.

These were the contributions of the night precision-bomber to the advancing columns of the Red Army in East Prussia. Men that would have manned anti-tank guns at Cracow were stacked in the mortuaries of Vaires, Orleans and Courtrai.

* * *

20,000 trucks and carriages, 974 wrecked and damaged locomotives. That was my interim tally, based on figures supplied to me by officials at twenty-five of the twenty-eight railway centres. It is a by no means complete record. The count is still going on as the damaged rolling-stock is sorted into rough categories. This is part of the price France and Belgium paid for liberation.

To assess the full effects of R.A.F. precision-bombing on a busy marshalling-yard, I went out to Juvisy, one of the most important of the capital's depots, only a few miles south of Paris.

A thin, chilling drizzle was falling when I arrived. It was a fitting mantle for the chaotic scene where the network of sidings had been. As a marshalling-yard it was practically unrecognizable.

All through the war German and French wagons, stacked with tanks, dismantled aircraft, cars, tinned food, drums of oil, petroleum, barbed-wire, concrete and the steady output of a thousand war factories, had creaked into the Juvisy yards. When the R.A.F. attacked in April the rolling-stock must have been standing in lines, like a wheeled host awaiting the command to trek. Into the centre of this vast pool of reserve material smashed 1,100 tons of bombs, followed by a series of U.S. attacks and a R.A.F. finale on the night of 7th/8th June. Juvisy is no longer a marshalling-yard. It is an undulating cemetery of splintered, rusting vehicles, an almost impenetrable chevaux-defrise of severed track, tangled telephone wires

and conical mounds, studded with pylons and moated with brimming craters.

Wagons, little damaged themselves but lifted by blast, have been hurled across the tracks and deposited on lines of closed wagons, crushing them to the axles. German whippet-tanks, once en route for Normandy, are three-parts submerged in pools of mud; military stores, too battered for salvage-hunters, rot in the rain beneath the derelict trucks that split end to end under the blast of a near miss.

This was Juvisy, months after the enemy

retreated to his own frontier.

Here and there muddled teams of repair workers scratched among the debris, stopping to warm their hands at braziers burning in the freak shelter of listing passenger-wagons. The labourers did what they could, lifting a beam here, extricating a wheel there, but without bulldozers and heavy cranes there was little anybody could do to level Juvisy, much less put it back into commission. 2,000 wagons were damaged, 1,700 being struck off the stock-lists as ruined. At a time when the enemy needed every inch of space in every form of wheeled transport available, railway centres like Juvisy were strewn with the wreckage of irreplaceable rolling-stock. Another dividend of R.A.F. precision-bombing, repeated at every centre I visited.

A gaunt foreman, his large hands red with the wet rust of some buckled girders he was lifting, paused to run his eye across the wrecked yards, bounded by the river half a mile away.

"Kaput!" he said, using a favourite word of continental railwaymen to-day. And then, with a fierce scratch of his thick moustache, "Where do we begin?"

For more than four years before Allied troops stormed up the Normandy beaches R.A.F. aircraft of all types had been strafing German-controlled transport. Sometimes they scored direct hits, more often a locomotive or string of carriages was raked with cannon-fire and scheduled for immediate repair. Outside most of the repair depots were queues of damaged engines. Inside the engineers worked long hours to put rolling-stock back on the supply routes and satisfy the insistent demands of the German transport staff.

One such repair-centre was Malines, principal railway "hospital" of Belgium. To-day Malines

is "kaput."

In the early spring of 1944 Malines repairsheds, which had once employed 4,400 men were turning out one heavy, one half-heavy and one light locomotive repair every day. In addition they patched up two passenger-coaches every twenty-four hours.

To-day the big sheds are steel skeletons, the interiors strewn with flattened machinery. Locomotives, most of which will never run again, rear their bogies over jagged ramparts of twisted girders or lie forlornly on one side, exposed plates seamed and buckled by bomb-blast. Others have settled, boiler-first, into shallow craters scooped in the concrete. And in the heart of this desolation is Belgium's first railway engine, made in Britain 110 years ago, a squat "Puffing Billy," not unlike the famous "Rocket." It has shared the fate of the locomotives that made it a museum-piece.

What immediate effect did these losses have

upon the German war machine?

I learned, from the grimy pages of railwaymen's notebooks, of endless delay and deviation among the military traffic traversing France and Belgium in the spring and early summer of 1944. Louvain—some tracks out of commission for twenty-four days; Aulnoye-fifteen days before certain lines of traffic were resumed; La Chapelle, in the heart of Paris, six weeks needed to restore 20 per cent. of the tracks; Villeneuve St. George, immediately south of Paris, where 1,500 men took six days to clear a single route to the capital. Delays of reinforcements and vital materials, long deviations involving the use of precious fuel; the ceaseless switching of skilled and semi-skilled labour to ease the flow of traffic through strangulation points, and, in addition, the incitement and encouragement of sabotage.

This is the yield of the R.A.F.'s transport attacks. Scaling the debris of these yards I remembered the almost inevitable newstime tag of the radio news announcer during those busy months, February to August, 1944: "Last night our bombers were out over France and bombed marshalling-yards at ----." To-day these yards are piled high with the burned and broken remnants of French and Belgian transport, and our friends are faced with a problem that will take years to solve. The April attack on the goods yards of St. Pierre de Corps. Tours, certainly cost the Germans quantities of war material and denied them the use of 1.818 trucks which might have built up the enemy's stocks in Normandy against D Day, but it also dealt the French railways a staggering blow from which they cannot recover until world peace affords them the means to make good their losses.

In view of this, how does the average Frenchman regard the attacks?



M. Morantin, interpreter of Arras, advanced towards me over the freshly laid tracks. He smiled and extended his left hand in greeting. His right arm, queerly twisted at the elbow, protruded from a worn overcoat, flung unbuttoned over thin shoulders.

"I have been sent to show you the damage. Come this way; the tracks have been repaired just here but there are still some of the locomotives you hit. Kaput."

We focused the cine-camera on a group of five locomotives, huddled in a rusting group outside the demolished repair-shed.

"Never think we French were not glad to pay this price to be rid of them!" was Morantin's comment. And he meant it.

Speaking without emotion he told me his story. His boast was that he had never worked an instant for the Germans. To avoid registration he moved about. One night he was caught out of his residential area and sentenced to a month's imprisonment.

For Morantin, under normal circumstances, this meant death. His identity card was a forgery; only the photograph was genuine. The Gestapo invariably checked up on prisoners' papers. Morantin waited for the inevitable questioning, but it never came. When his sentence expired he was discharged, his right arm seriously injured by Gestapo batons when he endeavoured to shield his head from a daily flailing on the way to the exercise yard.

"I owe my life to the R.A.F." he added. "While I was in gaol the telegraph and telephone system here was wrecked in a night attack. The Gestapo were unable to check my papers."

And then there was Sergeant Darras, pinched little ex-sergeant of the last war, thrice decorated for bravery at Verdun and the Ardennes. Darras had large, brown eyes which lit up when he opened the door to a team of men in Royal Air Force uniform. The bottle of "Liberation cognac," still concealed out of habit, months after the Germans had left the area, was drawn from its hiding-place for Darras's enthusiastic toast.

"To the R.A.F.! For years those letters meant one word to us. That word was 'hope'!"

I asked him how he had felt about the R.A.F. when bombs dropped on the nearby aerodrome had shaken down the kitchen ceiling. He finished the dregs of his glass and set it down, his brown eyes regarding me steadily. "M'sieur, Madame and myself were delighted to be bombed, providing the Boche got it as well. It was wonderful to see him scuttle to his shelter. I always liked to watch him scuttle to his shel-

ter. I always liked to watch him do that before I dived into my own!"

Darras and Morantin are typical, although in some of the towns, where civilian housing surrounded the target, the inhabitants suffered many casualties. There were some tears. " Dear God, that this was necessary!" exclaimed a woman, surveying the shapeless chunks of white stone that were once the historic Ecole Militaire at St. Cyr. But the great majority of Frenchmen and Belgians appeared to realize the stark necessities of war against the Germans. They showed no resentment, only here and there sadness or anxiety for the future and sometimes the strained look and unsteady hand of people who have been driven to the extremities of terror by the bursting of heavy bombs a few yards from their front doors...

There was one class of target which involved little or no civilian casualties. This was the R.A.F. pounding of sites connected with the enemy's V-weapons. Night and day through the summer of 1944 R.A.F. heavies loosed thousands of tons on centres like the Forest of Nieppe, where flying bombs were stored. Inspection of the havoc caused by these attacks convinced me that, bad as it was in London in June, July and August, the V1 campaign would have been infinitely worse had the enemy's depots, many of which were abandoned half-finished, been able to store, assemble and launch an uninterrupted flow of flying bombs.

Crouched in the smoky kitchen of her little farm, on the far side of the canal which skirts the Forest of Nieppe, Madame Verhaeghe heard the entire series of R.A.F. attacks on the German workings close by. Her experience was shared, not only by that part of her family of ten still working the farm, but by the German technical officer, compulsorily billeted upon her. Convinced, on more than one occasion, that she and her family would never survive the attacks, she none the less derived a certain satisfaction from them. The reason was that her point had been proved—she had repeatedly told the billetee that "Tommy would come!" when the officer boasted of the effectiveness of his camouflage.

He had a good reason to boast. The camouflage of the Nieppe workings in a corner of the vast forest was a brilliant piece of work. Long stretches of broad-gauge railway had been "sewn in" by an intricate network of artificial creeper, slung from tree to tree. For eleven months the enemy worked at the huts, camouflage and communication system of the depot. Curious villagers were kept at a distance by sen-

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tries and police-dogs. 2,000 men sweated and burrowed. Even now, if it were not for the devastation, the site is difficult to locate from the air.

But Madame Verhaeghe, who had lived through the last war in a British-controlled area, had faith in "Tommy." And Tommy eventually justified her faith by placing a total of 910 tons of bombs on the half-finished depot in attacks during July and August last year.

It was as though a typhoon had swept through that section of the forest. Lopped fir trees had fallen across the chain of ponds formed in the craters, ribbons of tattered camouflage draped what remained of the huts where parts of the flying bombs were stored, plant and equipment, including narrow-gauge trucks, were hurled into the tangle of undergrowth.

Madame and her family came through unscathed. Not one bomb fell on the scattered community within range of the depot.

At St. Leu D'Esserent, another half-finished depot, R.A.F. bombs sliced through the overhang of natural caves the enemy was using and sealed one of the main entrances. A French labourer, still suffering from shock, told how he was caught in the open fields opposite the caves during a heavy day-attack. Dazed by the violence of explosions, he lay in a ditch and saw an avalanche of rock descend on the workings Three hundred Germans, he stated, had been entombed and their bodies were still in the galleries once used for mushroom growing. Russian prisoners, working as slaves on the depot and treated as slaves were never treated when they fetched high prices in the markets of Rome and Carthage, made a dash for liberty during Thirty were mown down by the the attack. guards, others made good their escape and were concealed on the farms until the Allied battleline swept over the valley of the Oise.

"Mystery" V sites, such as the huge construction at Siracourt and Watten, were subjected to similar R.A.F. and U.S. attacks, and in each case the painstaking labours of many months disintegrated in as many minutes, bombs cutting through masses of concrete and tearing great rents in the inevitable railway systems.

The day and night pounding of Germany's flying-bomb sites in France did more than limit the robot offensive. It destroyed a vast quantity of plant, much of which was equipment the enemy could ill-afford to make whilst his factories were crumbling under constant strategic bombing. As long as he persisted in replacing

that plant other sections of his war industry had to go short.

Sometime late in March last year a watcher looking down from the parapet of a bridge over the Dordogne, below Bergerac, would have observed an unusual phenomenon. Hundreds of thousands of dead fish were floating down on the strong current. But had the observer worked at the Bergerac powder-factory, one of the most important in France, he would not have been unduly surprised, for the fish were casualties, killed by the sulphuric and nitric acid which poured from the gashed tanks of the poudrerie.

Bombs, dropped by a small force of Halifaxes on the night of 18th/19th March, robbed the enemy of this important source of explosive. It was the second of a series of five attacks on the four largest powder factories in France. At Bergerac the first bombs cut into the emergency water supply and the factory was burned and battered out of production. At Angoulême, farther north, eighteen Lancasters smashed every piece of plant in a single attack. This little force bombed on information supplied by a smuggled ground-plan conveyed to London by the French Underground Movement—a factual example of methods employed in popular spy fiction. At Toulouse poudrerie a fire at the alcohol plant could be seen 200 kilometres away and at St. Médard-en-Jailes, near Bordeaux, wide dispersal of plant over a rural area failed to save the German-controlled factory.

Thus, in five skilful blows, the R.A.F. put all four factories out of production. It employed a total force of 177 aircraft, dropped a total tonnage of 690 bombs. This must go on record as one of the most economic series of attacks in

the history of air warfare.

About the same time as Hitler was prancing round the famous railway carriage of Compiègne, accepting the surrender of his second major victim, a team of German technicians were engaged in a more sober pursuit on the Gironde. They were checking the stocks of French oil-depots at Blaye and Pauillac, on both sides of the wide estuary. At Blaye they had a good haul. The tanks contained some 28,000 cubic metres of benzine and lesser, but appreciable, stores of benzol, machine fuel and automobile oil.

Disappointment awaited the enemy Fuel Staff. On the night of 14th/15th August, 1940, when British fighters were beginning to grapple with the Luftwaffe over Kent and Sussex, a forlorn hope of eight R.A.F. bombers flew over Blaye and dropped the meagre total of 5½ tons of bombs. But the attack was an immense suc-

cess. Half the plant was destroyed and the fire burned for three days.

Across the river, at Pauillac, R.A.F. bombers dropped sixteen tons ten days later. This time the fire burned for three weeks. Blaye, Pauillac and other centres received far heavier attacks shortly before the liberation. Both are now scrapheaps of crushed frames, crumpled storage tanks, charred debris. But the one-armed Sous-Directeur of the Blaye depot preferred to praise the attacks in 1940, when a few British bombers kept hope alive along the Gironde.

This is the test case of France. The devastation inside Germany has not yet been checked. But from the lines of shattered trucks at Trappes and Orleans we can guess at the chaos in the Tempelhof yards at Berlin. The ruined depots of Blaye and Angoulème give us some idea of the effects of our air attacks have had upon Ruhr oil refineries, such as Bottrop and Dortmund. If the devastation is worse, or even as bad, the problem of maintaining rigid control over Germany's war-potential will be greately simplified, for Germany has received a weight of bombs that cannot be measured in terms of air attacks upon other countries.

French and Belgian people who lived through the R.A.F. bombardments of special targets last summer describe a precision bombardment by 100 Halifaxes as terrifying; how much more terrifying was an "area" bombing, by over 1,000 heavies, a common experience up to the date of surrender to millions of homeless refugees in Germany's largest industrial cities?

Lancaster—Round the World

By SQUADRON LEADER J. F. DAVIS, D.F.C., R.A.F.

N the autumn of 1942 the Central Navigation School (as it then was) sent an aircraft to North Africa to tour units and impart the latest ideas in navigation. The results of this experiment were sufficiently encouraging to justify further flights. In the spring of 1944 the pupils of the Specialist Navigation Course did an extensive navigation exercise to India and back, during which a limited number of lectures were given and information exchanged; this exercise also proved popular with overseas units. In the summer it was decided to extend the experiment to one of the most important overseas training centres, and arrangements were made for an extensive lecture and demonstration tour to Canada, again in one of the School's aircraft.

The idea behind these flights was quite simple. During the course of the war great advances had been made in the science of navigation, but due to the over-riding claims of the war in the West and the limiting factor of production, the results of these advances were only seen by the operational commands in the United Kingdom. News of new instruments and new developments filtered through to overseas theatres and to training centres, but in the absence of authoritative statements on the nature of new developments and the reasons why they could not be universally applied at the time, it was difficult for those outside the U.K. to appreciate either the extent (or limitations) of the progress made, or why these developments had not so far benefited them. This state of affairs could be, and was, remedied in some measure by supplies of literature and by the normal exchange of individuals between Home and Overseas Commands. Nevertheless, it came to be realized that these were not as effective as frequent personal contacts between overseas units and specialists who had seen the equipment and were thoroughly familiar with its progress and limitations.

The main advantages of this liaison were, first, that questions could be answered and often misapprehensions removed on the spot, and, secondly, that everyone, in particular the air crews, valued the direct personal contact with those who were supposed to be in the know at home.

But it became evident that this personal contact alone was not enough. The visitors should, in addition, bring the equipment with them and demonstrate its working and installation. Therefore they should bring their own aircraft, with the equipment installed, and, naturally, the more modern the aircraft the better. It was also thought better to use a British aircraft. The first experimental liaison flights were carried out in Wellingtons, but the Canadian tour in the summer of 1944 was done in a Stirling. An incidental, but substantial, advantage of the change was showing the Dominion a comparatively modern British four-engined aircraft for the first time, and of more

immediate benefit to the liaison team of covering longer distances and carrying out more ambitious flights.

The results of the flights outlined above had established this form of liaison as a profitable way of using a small number of aircraft and men which, up to the autumn of 1944, had been found, as far as possible, from within the training resources of the Central Navigation School. When at that date the Central Navigation School was absorbed into the Empire Air Navigation School a special Liaison Section was formed at the School to do the kind of work described. The main purposes of the Flight were to maintain close touch on navigational matters with all operational and training commands, whether of the R.A.F. or of Dominion Air Forces, and to achieve this by making frequent flights in its own aircraft to operational and training areas overseas. The staff permanently allotted to the Section was small but it was intended to provide the bulk of the crew needed for any particular trip from the instructional staff at the School.

For its first venture it was decided that the newly formed Liaison Section should visit Australia and New Zealand. These Dominions had never previously been visited by an R.A.F. aircraft during the wat, and due to the fortunes of war in the East had long been cut off to some extent from the United Kingdom. Tentative plans for the flight had been made before the formation of the E.A.N.S., and it was a measure of the growing importance attached to the work that all arrangements were complete by the middle of October, within a month of the School's elevation to Empire status. A Lancaster aircraft, the most suitable for the long distances involved, was obtained and equipped with as many modern navigational instruments as possible. Incidentally, mention should be made here of the only major modification carried out, the mid-upper turret being replaced by an extra astrodome for experimental purposes. Otherwise the aircraft was a standard Lancaster used in operations over Europe.

"WHY GO ROUND THE WORLD?"

The first plan envisaged the use of a shorter range aircraft. This meant that the route would have to be across the Pacific because of the very long sea-crossing from Ceylon to Australia. Acquiring the Lancaster meant that we could go to Australia either way. However, the original plan for the outward route was left unchanged since it allowed time for briefing by the Americans on the conditions prevailing

in the Pacific and also for obtaining first-hand experience of that area. These were thought important since the Pacific was the operational theatre of the Australians and New Zealanders, whom the Section was to see and with whom it was to discuss their problems.

Having decided on the outward route it was then thought profitable to give the Section's equipment the most exacting tests that could be devised on the way home. It was therefore decided to come home in the shortest possible time via Ceylon and the Middle East. This route would, it was thought, test not only the value of the equipment over very long and navigationally exacting stages but also its serviceability over a period of almost continuous running in difficult and variable climatic conditions. Also, of course, this decision meant that the equipment would have been operated in the manifold climates and conditions of the Pacific for several weeks without major overhaul before being subjected to this final test.

These preliminary remarks should make it clear that the primary object was not to fly round the world, as such, nor to set up any records. The main objects were, first, to tell the R.A.A.F. and the R.N.Z.A.F. about the most up-to-date navigational technique and equipment in use in the European Theatre and, in exchange, to learn all about Pacific conditions from the navigator's point of view; secondly, to demonstrate the equipment and obtain opinions on its suitability for the Pacific Theatre; thirdly, to try the equipment out in many different environments; fourthly, to enquire into the methods of training employed in that theatre.

All these objects were attained. In addition, valuable data were obtained on the performance of the Lancaster in tropical conditions and a considerable amount of information on such subsidiary subjects as the operation of air transport routes, operational employment and suitability of other types of aircraft, and the little-publicised but vital part played by the Australians and New Zealanders in the South-West Pacific. Unfortunately, nearly all that was learnt on both the primary and secondary subjects must remain unpublished for the present. All that can be done in this article is to attempt to give a general impression of the trip and detail the basic facts.

First, a word about the crew. There were ten of us—six officers, three airmen and one civilian. The six officers formed the operating crew. All were capable of lecturing on navigation subjects. The three airmen—fitter, rigger and an electrician—formed the maintenance

orew. The civilian, a specialist on navigational instruments from the Ministry of Aircraft Production, was with us primarily as a technical expert but became a most valuable crew member, combining the many roles of navigator's assistant, steward, instrument repairer, photographer and teller of after-dinner stories. He had, literally, miles of film and an even longer string of stories.

As will be imagined, ten men in a Lancaster meant very little space per man. The patience shown by most of the crew on the long flights was remarkable, especially that of the airmen who slept in the back and were stepped on at frequent intervals by those going down to the tail. The baggage cramped the available space even further; 40 lb. of baggage per person does not seem much, but 400 lb. of all shapes and sizes, containing all varieties of clothing, was a formidable sight. Those entering the aircraft to be shown over it were surprised to have to fight their way up from the tail, tripping over cases underfoot and with their heads engulfed in festowns of uniform hanging from the roof. No sooner were these obstacles passed than they were faced by the spares, small boxes of spares and tools entangling their feet, large pieces of equipment with sharp corners tearing at their clothes, and coils of cable stowed in the roof reaching down to throttle them. We got to know all this and used to trip through with fair confidence and few casualties, but our visitors were not so well prepared. We admired their dogged perseverance.

Our route was fairly straightforward. Outward it was through Prestwick, Reykjavik, Montreal, Washington, San Francisco, Hono-lulu, Canton Island, Tutuila (Samoa), and Auckland. This was not done in any great hurry, for we left England on 21st October and did not arrive in Auckland until 1st November, local date. It may seem odd that we should have gone to Canada via Iceland, the short-range route, but very strong headwinds and bad weather on the more direct and southetly route prevented us going more direct and non-stop. It was cold in Iceland with ice on the runway when we took off and we experienced three hours mild icing on the way to Montreal, the pitot lines becoming blocked and most of the navigational instruments thereby stopping. This was, we thought, a good prelude to the tropics and well provided one of the extremes of climate the aircraft would have to suffer. Apart from these minor incidents there is little to report of the flight so far as San Francisco. Two days each in Montreal and Washington and then a perfect flight across the

States to Frisco. Not a cloud to be seen, enormous visibility and a faseinating route. The close country of the East, succeeded by the great plains of the Middle West, and then by the Great Salt-Lake Desert. Finally, the Pacific sea-board and the Golden Gate seen at dusk amid the drifting haze.

Two days were spent quietly at San Francisco waiting for weather and clearance, admiring the prodigious hills and the blaze of lights in the shipyards before we started the Pacific crossing. This was, I think, the first time we had a feeling of adventure. Not that there was, in point of fact, anything to feel adventurous about since scores of aircraft cross the Pacific as a matter of routine every day, but even so, it is only comparatively recently that this crossing has become routine, and for most of us it was the first time we had seen the Ocean, let alone flown across it.

We flew overnight, a rather dull thirteen and a half hours' haul against a headwind but fairly excited at the thought of seeing Honolulu in the early morning. Alas for the romantic vision we had had of Honolulu delights, of flowers, dazzling beaches, dusky maidens, guitars, moonlight and all the other properties. Perhaps they are there—we never knew. We landed at the airfield, we slept at the airfield, we took off again at four o'clock the next morning.

At Canton Island we stopped less than two hours only, to check up on the weather at Samoa. It was very hot, there was dazzling sand, only one tree, and hardly anything else above water but the runways. No doubt it is not fun for those who are stationed there but we felt as we flew away that by seeing so little we had seen something. Samoa was very different but equally enjoyed. We spent the night there and three of us were taken on a tour of the island. Our memories are very confused; of luxuriant vegetation; of tales of a "whiten the race "policy in Apia; of brilliant starlight; of lights reflected in the fjord-like waters of the harbour; of disappointment at finding the "follies" we went to see were but native houses; of amazement that Samoan naval ratings never went to sea but got overseas' pay: of abundant hospitality. We were delighted and thought we could understand the magic appeal of the Pacific to earlier travellers.

The next day we arrived in Auckland, sixty hours elapsed time after leaving the United States. This looks a fairly fast time, but faster crossings are frequently made. As I have said earlier, Pacific crossings are now routine, a great change from the rare and comparatively

hazardous enterprise they used to be before the war. This, of course, is due to the necessity of developing the Pacific routes for transport and reinforcement traffic. This has been done on a tremendous scale, involving an enormous expenditure of money and materials in building airfields and providing facilities. The most striking features we noticed were the airfields themselves and the meteorological services; on the airfields, the size and good quality of the runways, the speed with which they were constructed and the quality of the servicing equipment were all very impressive; the weather forecasts on all stages of the crossing were of a very high standard. On the stages from Hawaii to New Zealand the weather is fairly stable and seasonable in character and (I make this deduction with due deference to professional meteorologists) therefore easier to forecast than the variable weather of temperate zones, but the weather between San Francisco and Hawaii is conditioned by much the same factors that affect climate in the North Atlantic and British Isles. The forecast for this stretch, as wide as the Atlantic, was remarkably good. It is a curious fact how good the forecasts are for long over-sea crossings; for example, for transatlantic flights or, as we found out later, for the trip from Australia to Ceylon. Incidentally, the most graphic description of weather we had during the whole trip was in the States. On asking the met. man what we could expect he answered briefly "There isn't any weather! "Nor was there.

At the time we crossed the weather was almost uniformly kind to us so far as cloud and turbulence was concerned. Nor were the winds troublesome. Not that we were very worried about headwinds as we had ample range for any of the legs. Our maximum stillair range allowed at least 50 per cent. margin on the longest stretch. The navigational problem in which we were primarily interested was not, therefore, very difficult. At 8,000 feet, at which height we flew all the way, we experienced, apart from a few short patches, clear skies and complete absence of static so that we could use any available aid without interference. The only item in the navigational repertoire with which we had any difficulty was drift-taking, owing to the generally smooth surface of the sea. The possibility of aids being blotted out by weather or by instruments going mechanically unserviceable had, of course, always to be guarded against. This is true of all areas on the earth and nowhere more true than in the tropics where sudden unforecastable storms can blot out sea and sky, and where the damp hot air can do serious internal damage, not noticeable until too late, to radio and mechanical instruments. But we had no trouble of this kind. Instruments functioned satisfactorily, and the only storms we saw were small, isolated and easily avoidable. Even the famous inter-tropical front was very mild, and we crossed it at an average height of 8,000 to 9.000 feet.

Our arrival in New Zealand on 1st November marked the beginning of the real work of the tour. Between that date and 11th December, the day of our departure from Australia. we visited twenty-four units in the two Dominions and adjoining territories. Recital of a string of names would be tedious, but it may be worth mentioning that of these units five were in New Zealand, one in Fiji, four in New Guinea and the remaining fourteen in Australia, ranging from Port Pirie on the south coast through units in the East and North to Perth on the west. Naturally, to carry out such a programme in the time, some sort of routine was necessary. In general, we would lecture for approximately two hours, giving three or four lectures in that time on the instruments and the techniques of using them. After the end of the lectures all who were interested were then shown over the aircraft in small parties and this would go on until all who wanted to had seen the equipment demonstrated to them. Thus, even the smallest station could not be said to have been "done" in less than half a day. If our stay was for one day we would fly to the place in the morning, work in the afternoon and fly on again the next morning. If the stay was longer, say, at important schools or headquarter units, then further time was allocated to discussions and exchanges of views. There were only six days in the period before departure for England on which we did not both fly and do some form of lecturing, discussion or demonstration on the ground. Two of these were days off and on four the flights were too long to leave any time over in the working day. It will thus be seen that judging by the volume of effort expended our time was not wasted and we could at the end say justifiably that it was not a joy-ride pure and simple.

This is not to say that we did not have an exceptionally good time; there were, after all, the nights left free (except one during which we flew) and we were certainly entertained. The energy and enthusiasm, amounting sometimes almost to ferocity, with which this was done was remarkable. Everywhere we went we had an overwhelming and delightful reception.

Nothing was too much trouble for our hosts, and the welcome we received as representatives of the R.A.F. was genuine and spontaneous.

Genuine interest was shown in what we had to tell and in the demonstrations. In return we were given a very valuable insight into the difficulties and problems which face air crews operating in that area. The conditions there are, of course, very different from any experienced in Europe and, in addition, the R.A.A.F. and R.N.Z.A.F. have unfortunately had to operate without the modern equipment of all kinds that have been available to the R.A.F. at home. They have been fighting a little-publicised but very difficult war for over three years, sometimes in appalling conditions and often with antiquated aircraft. The skill, determination and ingenuity in the face of all these difficulties impressed us very highly.

Our visit to New Guinea was possibly the most impressive part of the tour. At the time we were there the weather was excellent and so we did not see the place at its worst. Even so, the country looked unfriendly enough. We flew in over Port Moresby and crossed the Owen Stanley Range through the Kokoda Gap, flying low over the pass at 10,000 feet. The Kokoda trail was a terrifying sight, very steep and winding through dense jungle even at its highest levels. It was on this trail that the Japanese, after they had succeeded in crossing the Owen Stanleys were finally halted in their drive for Port Moresby in 1942. This, it must be remembered, was done by the Australians who then drove the enemy back over the mountains towards Salamaua. We landed at an airfield near Lae after passing over the scenes of the bloody fighting at Salamaua, Lae and Finschhafen in 1942 and 1943. These places looked very peaceful and even innocent in the bright sunlight—a deceptive appearance we felt.

We landed at three other airfields in the New Guinea area, all separated by pockets of Japanese. The flights over these areas were our only contact with the enemy. Contact is perhaps not the right word since we were not molested at all.

An interesting point about the Owen Stanleys is the cloud formation during the day-time. At the time we were there no clouds were to be seen in the early morning, but by noon considerable cumulus had built up over the mountains. During the afternoon vertical development continued at a tremendous rate until, by evening, the whole length of the range was surmounted by a massive curtain of cumulonimbus reaching to an estimated height of well

over 30,000 feet. It is impossible to fly in this cloud, so violent are the vertical currents, so that all flights from the north to the south of New Guinea, and vice versa, have to be done early in the day.

We were once again impressed by the quality of the airfields. Runways capable of taking the heaviest aircraft at present in service in the area had been constructed at astonishing speed in the most unpromising country. Apart from the rough surface, which was hard on our tyres, they were as smooth and satisfactory to use as any in this country. Often the runways were constructed alongside the bomb-cratered Japanese strips and wrecked aircraft. There was no mistaking which was which!

After New Guinea, with its over-abundant greenery, the deserts of North-Western Australia were a marked contrast. These were perhaps more striking than the deserts of Arabia or Africa because they were so unexpected (a confession of ignorance on our part!) and also because white communities had chosen to live on the shores of the desert, cut off from all intercourse with the rest of the Continent except by sea.

The desert was our last glimpse of Australia when we left from the North-West Cape for Ceylon in the late afternoon (local time) of 11th December. We were sorry to leave Australia but only too glad to take off as the temperature on the ground that afternoon had been 120 degrees in the shade—and we could not find any shade! This was the hottest we had struck and we wondered how the aircraft would behave on take-off. But all was well. The engines did not overheat and at full load she sailed off the runway without the slightest difficulty

The journey home was remarkably uneventful. The weather on the stage to Ceylon was almost exactly as forecast. We flew at about 5,000 feet the whole way in order to keep out of strong headwinds higher up. This meant that we had a good deal of flying in and out of the tops of small cumulus which interfered with astro observations but otherwise inconvenienced us very little. In spite of a small headwind component the time for this leg of 2,710 nautical miles was only fifteen hours. After a stop of approximately two hours in Ceylon we flew on to Masirah, reaching there on the afternoon (local time) of the 12th. On again four hours later to Cairo, reached in thirteen hours after flying round Aden and up the Red Sea. Off again after a very short stop (just to have breakfast) to Malta, where we waited seven hours before leaving for England early on the morning of the 14th. We waited here because we were not expected at Northolt thatil, ten o'clock on the 14th. Unfortunately we had to be diverted from Northolt owing to fog and landed at another airfield almost exactly seventy-two hours after leaving Australia.

Apart from the fog in the London area we had no trouble with the weather during the whole run from Australia. Everywhere else we flew in the clear with only moderate headwinds. Nor did the aircraft falter once. The engines behaved magnificently, with never a suspicion of any trouble. The distant-reading compass packed up once for a short period but the fault was not serious, easily traced and quickly put right. All other equipment functioned without a hitch.

A few statistics may be of interest. The whole tour lasted fifty-three days, during which

36,000 nautical miles were covered in 202 hours flying time—an average ground speed of 179 knots. We flew on forty days out of the fifty-three—an average of over 1,000 statute miles per day. The only serious unserviceability we suffered was in New Zealand, where we were delayed forty-eight hours at one station waiting for a new tyre from Australia. During the tour in Australasia we gave about 400 lectures to about 6,000 members of the Dominions Air Forces.

In conclusion, let me express on behalf of the crew of the Lancaster our thanks to all those who helped us on our way, in particular the units and formations of the R.A.F. Transport Command, the U.S. Air Transport Command, the U.S. Naval Air Transport Service, the R.N.Z.A.F., the R.A.A.F. and Qantas Airways.

A Study in Passive Defence

By Flight Lieutenant R. F. Delderfield

N his farewell speech to Balloon Command, at its official stand-down on 5th February, 1945, the Secretary of State for Air, Sir Archibald Sinclair, Bt., K.T., C.M.G., M.P., quoted from a little-known verse of the National Anthem. He thanked the Command for five and a half years' manful service, during which period, he said, it had played a little-publicised but vital part in "frustrating the knavish tricks" of the enemy.

Balloon Command, as an independent Command, is passing into history. The prospect of hundreds of silver balloons, straining at taut cables over Britain's biggest industrial centres for more than half a decade, has merged into the general background of the Second World War. But the story of the Command throughout its comparatively brief life is always interesting and often thrilling. It is the story of passive defence, lacking, perhaps, the fierce variety of Fighter, Coastal and Bomber Commands, but with a variety of its own, which comes into focus when one studies the progressive change, adaptation and development to which the Command was subjected between 3rd September, 1939, and 5th February, 1945.

Its tactics and its constitution changed with the tactics of the enemy's air attacks. In one feature only did it remain constant throughout the five and a half years. From first to last its object was to deter and ward off air attack. In this aim it was eminently successful. What it achieved in actual kills has not been announced. We can guess, with some accuracy, at the extent of moral effect it had upon the Luftwaffe and assess its value as a deterrent to the enemy's attacks upon our war industry. Viewed in this light, Balloon Command is rather like a suit of chain-mail. One judges its value upon the stabs and blows the wearer did not receive and upon those the assailant failed to administer for fear of badly bruising his knuckles.

The story of Balloon Command begins at an Air Ministry Conference in 1923, when the project of flying a barrage of balloons against a then hypothetical enemy air force was seriously mooted.

For the next decade progress was painfully slow. One obstacle after another was being negotiated as the project began to take shape in the minds of farsighted but often frustrated men. The first balloon was ordered in 1924 and two test balloons, constructed in 1925, failed to satisfy at the initial tests.

Early experiments had been based, primarily, upon last-war experience. In 1918 ten "aprons" were flying over London. Each apron consisted of a unit of three balloons and cables, linked together by a supporting freize of shorter wires with trailing ends. Post-war research established the impracticability of developing the apron. It was found that the central balloon had to carry

more than half the weight of the curtain. In addition, the escape of one balloon generally meant the loss of three.

DEVELOPMENT PACED BY WAR-THREATS

The "L.Z." balloon ultimately proved the most satisfactory. This streamlined kite balloon, fitted with fins and based on the 1915 French model, was designed to ride the wind, and after successful tests development of the model proceeded fairly rapidly. By 1936, when the international situation was growing gloomier each succeeding month, the London barrage had been initiated.

At the same time the Defence Research subcommittee dealing with balloon defence asked the Air Staff to consider the establishment of a number of similar barrages designed to protect Britain's industrial centres in event of war. These did not come into being until after the commencement of hostilities three years later.

In the meantime No. 30 (Balloon) Group had been formed within Fighter Command. Its official birthday was 17th March, 1937. With war becoming more likely every year, the tempo of the Group's development increased.

The Munich crisis gave No. 30 Group a dress-rehearsal. 142 balloons were flown in the London barrage, but it was soon clear that the target of experienced crews, 10 per cent. of which were to have been regular airmen, had not been reached. In the ten squadrons of the Group only 16 pen cent. of the crews had been trained and the experiment was made with the help of 500 Royal Artillery apprentices, borrowed from Woolwich, and some 400 airmen from other R.A.F. Commands who had never even seen a balloon. In spite of this the Munich tryout was a success. The experience gained proved invaluable when war broke out almost exactly one year later. 15 6 H

By this time the barrage had expanded to such an extent that it was no longer possible for Fighter Command to administer without affecting their own operational efficiency. On 1st November, 1938, Balloon Command was formed under Air Vice-Marshal O. T. Boyd, C.B., O.B.E., M.C., and three additional groups were added to the original. The command was made directly responsible to Air Ministry for administration and supply. Operationally, however, it was still under the A.O.C.-in-C. Fighter Command. The Auxiliaries were embodied into the Command in June, 1939, and on the first day of the war balloons went into action.

ACTIVE SERVICE

On 3rd September, 1939, d barrage of 444

balloons was flying in London and 180 flew in the provinces. Of these, nineteen became weather casualties and work immediately commenced on methods of combating the ravages of wind and lightning. Very little could be done to combat lightning except to haul down the balloons when lightning conditions prevailed, but as personnel became more experienced and new mooring methods were devised, the dangers of casualties by high wind receded. Fifteen of Britain's industrial and shipping centres were afforded balloon protection at this early stage, including Birmingham, Coventry, Derby, Liverpool, Manchester, Portsmouth, Southampton, Plymouth, Cardiff, Newcastle, Sheffield, Hull, Glasgow, Bristol and Runcom.

The outbreak of war found Britain with sighteen balloon centres and forty-seven squad-sons, but the barrages were 800 balloons under establishment and there was a serious shortage of equipment. It was still only a beginning.

The London barrage was the trunk of the young tree. From now on branches began to shoot out in various directions, wherever, in fact, their protection was felt necessary to operations and the maintenance of industrial output. On 19th December, 1939, the Chief of Air Staff drew attention to the special need to protect our aircraft factories. A protective barrage sheady existed over the Rolls Royce engine works. Steps were immediately taken to afford such protection elsewhere, and there can be no doubt that many factories were spared low-level bombing on this account during the winter blitz of 1940-41.

At the same time balloon protection was given to fleet anchorages at Forthbridge, Scapa Flow, Kyles of Lochalth, Falmouth and Londonderry. After the deployment of a barrage at Forthbridge no further air attacks were experienced. All these barrages had to operate on coasts subject to the worst gales experienced in the British Isles; yet they remained 100 per cent. operational throughout the winter months.

Protection of the Thames and other estuaries against mine-laying aircraft was also developed, balloons being flown from water-borne craft in the first year of the war. On the Thames a pleasure-steamer was requisitioned as Squadron H.Q., and crews operated, under grave disadvantages, from drifters.

Some of the drifter men passed through grim experiences. During bad weather it was difficult to supply them with food. Throughout one such period a supply-tug had to approach anthored drifters broadside on and throw supplies on board at the moment of passing. Another drifter began to leak through its rivets

and the crew were continually at the pumps to keep her afloat. A third balloon anchorage, fixed on the drifter *Helen of Troy* was so isolated in bad weather that, on one occasion, the crew were down to their last crust before stocks of food could be replenished.

Meanwhile the Command had scored its first kill. Balloons had been flown at French bases since the arrival of the first Expeditionary Force and it was the Le Havre barrage which accounted for the first hostile aircraft to fall to Balloon Command.

With the opening of the first phase of the enemy's pre-invasion air onslaught upon Southern England, balloons were seen in a new role. The Luftwaffe preceded its attack upon airfields by an attempt to paralyse Britain's Channel shipping. On 4th August, 1940, the first Channel convoy protected by towed balloons moved along the coast from Falmouth to Sheerness. From that time onwards, for a period of three years, convoy escort was to prove an important part of Balloon Command's routine duties.

The journey of the first balloon-escorted convoy proved uneventful, but during the return trip the ships were subjected to a violent attack by enemy E-boats by night. The following morning thirty Ju. 87's, escorted by Me. 109's, attempted to dive-bomb the convoy, the fighters concentrating on the balloons while the Junkers bombed the vessels. Several balloons were shot down and after the fight R.A.F. operators took over a variety of duties, tending wounded, assisting the seamen and even steering some of the vessels. Work in connection with the protection of ships involved the setting up of shore servicing stations in almost every port round the British coast. "Q" Flight of No. 952 Squadron, which was engaged in convoy work for a considerable period, earned a large number of naval decorations, probably a higher percentage than any small unit of R.A.F. personnel throughout the war. They shared two M.B.Es., five D.S.Ms., four B.E.Ms. and five "Mentions."

1940 proved a hectic year for the new Command. The Battle of Britain was over and won before the Command celebrated its second birthday. Throughout that twelve months its personnel had suffered a number of casualties. Perhaps the best proof of the defensive usefulness of balloons was provided by the enemy himself, who persistently attacked the coastal and other barrages and shot down twenty-three of Dover's balloons in six minutes on 31st August. Within a few hours eighteen of the casualties were replaced. The same evening

enemy aircraft accounted for a further fifteen. Sixteen of these had been replaced and were flying on the morning of 1st September.

ENEMY TACTICS MATCHED

A lull followed the strenuous days and nights of the 1940-41 assault. Balloon operators settled down on their sites to combat the age-old enemies of fighting men—boredom and bad weather. But the kull was short-lived. The Luftwaffe opened a series of savage attacks upon Britain's cathedral cities. The new tactics came to be known as the "Baedeker" raids. Balloon Command answered with a counter-move—the deployment of mobile squadrons.

An outstanding example of the disconcerting effect balloons have upon attacking aircraft was observed at one British cathedral city in the spring of 1942. The target, already twice attacked, was provided with a defensive balloon barrage against the probability of a third visit. The enemy returned, but by far the greater proportion of his bombs were discharged well outside the city boundary and a thickly populated area was spared another sixty tons of high explosive. Only three landmines fell near the target and these burst just outside the limits of the barrage.

But by this time the constitution of Balloon Command had undergone a radical change. A large percentage of the male crews were being remustered to other R.A.F. trades. Their place was being taken by W.A.A.F. operators.

The step to substitute women for men in an R.A.F. trade demanding heavy physical labour was revolutionary. The decision was not made without a good deal of thought, discussion and hesitation on the part of the deciding authorities. Air Marshal Sir E. Leslie Gossage, K.C.B., C.V.O., D.S.O., M.C. (who had succeeded Air Vice-Marshal Boyd as A.O.C.-in-C. of the Command) admits that, at one time, he doubted the ability of women to stand up to the hardships required of operational crews. But the need of men was urgent and the decision was made, subject to certain adjustments being made in the numerical strength of the crews.

Three hundred volunteers were asked for and of the total number responding, most of them W.A.A.F. fabric-workers, 247 were passed medically fit. Courses were instituted at Cardington and provision made for a large number of new intakes at this and other centres.

Balloon crews had originally consisted of ten men and two N.C.Os. This figure had subsequently dropped to seven men and one N.C.O. It was originally planned to allot twenty women to each balloon, but this estimate ultimately fell to sixteen aircraftwomen and two W.A.A.F. N.C.Os. per balloon.

Trainees passed their course and went out to sites in London, Cardiff, Sheffield, Portsmouth and Glasgow. They were sent to other sites as trainees. The first Cardington course commenced on 5th May, 1941. By 30th May the following year a total of 574 balloon sites had been taken over by the W.A.A.F. and an additional 5,000 airwomen were under training for the work. The scheme reached its peak on 13th January, 1943, when 1,029 sites were staffed by all-women crews. This was 47 per cent. of the entire personnel of Balloon Command at that time.

GALLANTRY UNDER FIRE

Airwomen performed their new duties with enthusiasm. There are several instances of gallantry under fire in the records of W.A.A.F. balloon sites at this time. Lilian Ellis, corporal of a site in South Wales, won the British Empire Medal in May, 1943, for her gallant behaviour during an attack on her site. Seven casualties, three of them fatal, were caused among the crew and Ellis herself was wounded, refusing medical attention until other members of her crew had received first-aid.

For coolness and resource under fire, Sergt. B. Holloway, another W.A.A.F. balloon operator, was awarded the B.E.M. During an attack on the area immediately surrounding her site, in July, 1942, she led her crew in combating a rain of incendiaries. They succeeded in extinguishing a total of sixty-five anti-personnel bombs, thereby preventing an immense amount of damage. A third N.C.O., Cpl. J. M. Standing, was commended for gallantry on her balloon site.

These women are typical of the cool-headed and energetic W.A.A.F. to be found on any of a thousand sites between the summer of 1941 and that of 1944. They performed a strenuous task with skill and courage and their inception into the barrage released a large number of trained airmen for balloon-operating overseas.

BRIDGEHEADS, BEACHES, "TIP-AND-RUN"

Most of the Allied operations aimed at establishing bridgeheads on hostile coastline were assisted by crews of the Command. Squadrons served in North Africa, Algeria, India, Iraq and Ceylon. They went ashore with the assault-troops in Sicily and Italy. The helped to maintain the bloody bridgehead of Salerno. They went in with the landing barges at Corsica and they were seen, at various stages of the war, in the Persian Gulf and along the Suez Canal.

During the relative stalemate in the North-West, between summer, 1941, and D Day, the Command was called upon to grapple with another form of attack on Britain—the "tip-andrun" raids on the South Coast.

After the failure of the Baedeker attacks the Luftwaffe persisted in a series of short, sharp raids upon seacoast towns, notably those ranging from the Straits to Lands End. Although little damage of military importance resulted, the civilians suffered many casualties and it was decided to afford these towns a special measure of protection, in addition to the passage of constant fighter patrols.

The scale of these attacks increased when Baedeker raids became too costly. German fighter-bombers, almost exclusively F.W. 190's, flew in at zero height and remained over the

target only a few seconds.

A South-Coast town was chosen to supply proof of the efficacy of balloon protection against tip-and-run attacks and, once the barrage was established, two subsequent attacks proved ineffective. Plans were made for the extension of the scheme, but the form of attack was discontinued and the plan abandoned. It affords proof of the Command's mobility and flexibility of purpose.

Preparation for the invasion of the Continent called for fresh efforts from the Command. New barrages had to be formed to protect newly won beach-heads and mulberries against the likely contingency of dive-bombing attacks by the Luftwaffe. There were three quite separate commitments for the invasion, which may be outlined as follows:—

- (a) An exclusively R.A.F. commitment concerned with the protection, by balloons, of beach-heads, "mulberries" and any ports captured in the initial and subsequent assaults by Allied troops.
- (b) Another exclusive R.A.F. obligation, i.e., the protection of embarkation ports not already provided with a balloon barrage on this side of the Channel.
- (c) A joint Naval and Balloon Command commitment—the protection of invasion and supply craft for the build-up on the enemy coast.

Balloon-manning personnel crossed the Channel with the assault troops on 6th June, and all these requirements were met.

The attacks which did develop were weak and sporadic. Allied air mastery reduced the dangers of disembarkation to a minimum but balloons were soon flying over captured ports, ammunition dumps and rail-depots. Altogether 4,000 officers and men of the Command participated in the D Day operations. They were a hand-picked contingent. All had undergone battle-training similar to that given Commando units.

The decline of the Luftwaffe denied Balloon Command a real opportunity of demonstrating its usefulness on the Continent, but only a few days were to clapse before it was given a chance to set a new standard in rapid deployment on a

hitherto unparalleled scale.

On 13th June the enemy opened his new campaign against Southern England with the despatch of the first flying-bombs. Balloon Command, now under Air Vice-Marshal W. C. C. Gill, C.B., D.S.O., M.C., T.D., D.L., the first Auxiliary officer to be made an Air Vice-Marshal, moved from the wings to the centre of the stage.

"The Biggest Barrage in History

The Command had accurate information of the enemy's intentions regarding the new terror weapon. Plans to combat this menace had been made in the latter half of 1943. Southern England's defence against V1 was to consist of massed ack-ack, fast fighter patrols and a belt of 500 balloons. The latter were to form a defensive belt right across the south-easterly corner of England, stretching through part of Sussex, Surrey and Kent. The belt was based on two centres, Biggin Hill, famous fighter station of the Battle of Britain days, and Grayesend.

The deployment of 500 balloons and the vast amount of organization and staff work attendant upon siting and provisioning as many sites, dotted about a rural area, was expected to occupy a period of eighteen days. New sites had to be cleared and dug, tents pitched, miles of telephone wire laid and, in some cases, makeshift tracks driven through patches of bracken and undergrowth to enable supplies of hydrogen, food and water to reach dispersed crews.

An immense task faced the command. The solution of their manifold problems demanded mapid decisions and ingenuity. A huge volume of hydrogen was required to keep the barrage flying. In a successful effort to cope with this demand a stream of lorries drove day and night from Midland depots to the belt, where they were emptied and turned round in the shortest possible time.

Existing conditions, mainly administrative and domestic, precluded employment of W.A.A.F. personnel in the barrage, and in view of the fact that so much W.A.A.F. substitution

had taken place this increased the Command's difficulties. After making provision for the D Day, barrages few men remained available and constant increases in the size of the anti-VI barrage intensified the man-power shortage.

The difficulty was mainly overcome by a drastic reduction in the number of men per brew. This was only made possible by the adoption of a completely new mooring and handling procedure, based on mobility, and minimum equipment. It necessitated the taking of a certain amount of risk in respect of balloon casualties. It should also be stressed that, whereas the chief value of the balloon barrage had been as a deterrent in preceding years, in this venture deterrent value was nil against unpiloted aircraft.

W.A.A.F. personnel, although not operating on the sites, cooked at headquarters, served the telephone network at hastily improvised exchanges in the direct path of flying-bombs, delivered supplies to the sites and catered for the hundreds of lorry drivers whose vehicles pulled up under the gantries for the discharge of filled cylinders and the reloading of empty

An R.A.F. observer who visited the Biggin Hill centre in late June watched relays of girls outting thousands of sandwiches for the drivers and operators. He saw other girls operating switchboards in improvized shelters, and at another centre, nearer the coast, W.A.A.F. personnel plotted the course of each approaching bomb.

Defence was organized in zones. Fighters patrolled the Channel, massed ack-ack batteries, supplemented by the Bofors and Hispano gunners of the R.A.F. Regiment, lined the coast and covered an area extending 1,000 yards out to sea and a short distance inland. A second fighter belt operated behind the limit of the guns, and between this zone and London was the last line of defence—the balloon curtain. A bomb penetrating previous defence zones had to pass through the mathematically spaced cables of the barrage.

SCHEDULE CUT BY THIRTEEN DAYS

The deployment of the first 480 balloons had been scheduled to occupy eighteen days. It was accomplished in five days. The whittling down of this time-limit stands out as one of the most unusual feats of organization in the history of warfare. It surprised the men who accomplished it.

But an even bigger effort was required. As the enemy stopped up his attack it was decided to double the curtain's strength. After a brief



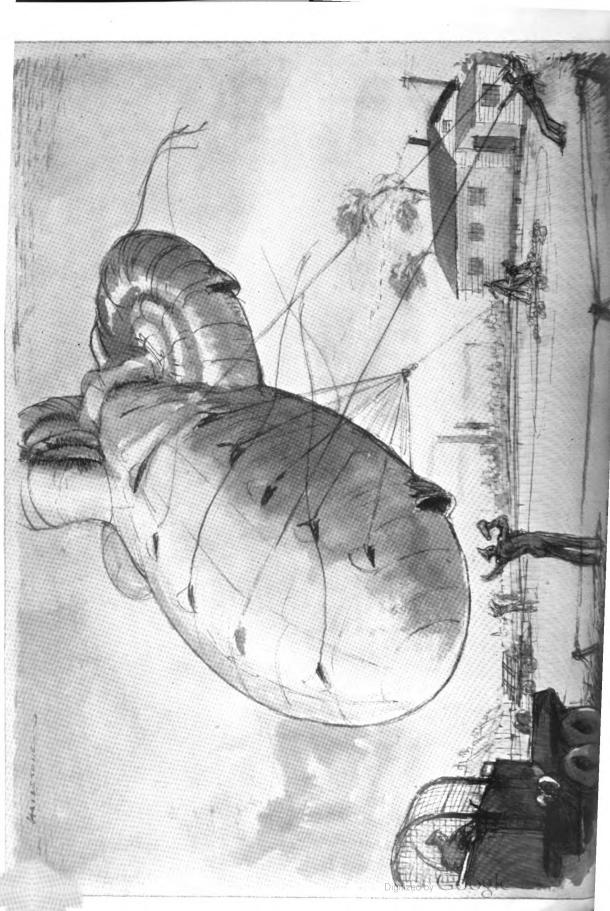


(See page 163)

NADJAB—A HUTMENT

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NADJAB, NEW GUINEA Crew climbing up to quarters, on left



pause the barrage was increased to 1,000 balloons. The extent to which existing equipment had to be improvized in order to effect this 100 per cent. increase can be imagined. Exclusive of transport, 8,000 tons of equipment were needed by the Command to combat the flyingbomb. Balloons were gathered in from every available source. Men and equipment poured into the belt and the quiet lanes of the Kent-Surrey border had never carried such a volume of mechanical traffic. Good weather held and it was no hardship for crews to bivouac in odd corners of meadow and ploughed fields. Their morale was excellent and rose even higher when their cables began to harvest a steady crop of flying-bombs.

Londoners looking towards the coast could now see a portion of the largest balloon curtain in history. Each day the June sun gleamed on more and more balloons, stretching in a vast belt across one of the prettiest patches of coun-

tryside in the British Isles.

But the barrage went on expanding. Ultimately there were nearly 2,000 balloons flying in the curtain.

Of the 8,000 flying-bombs launched—an average of about 100 a day for a period of eighty days—a total of 29 per cent. reached London. Of the remaining 71 per cent. the barrage was credited with 278 kills. One crew, sited at the apex of a "V," where two busy bomb-runs crossed, accounted for three flying-bombs, losing as many balloons in a period of eight days.

It was interesting to note the erratic behaviour of a flying-bomb when a cable was struck. No two impacts were the same. Sometimes the bomb exploded in mid-air, sometimes it yawed and crashed or chugged off in another direction, and on other occasions it simply staggered, lost height and fell to earth a considerable distance away. There were a number of casualties, some fatal, among the operators, but losses were seldom inflicted upon the crew claiming the kill.

At Balloon Headquarters in London a secondby-second watch was kept on every bomb approaching the coast. Each time one arrived within the orbit of the huge-scale map in the Operations Room, a corresponding symbol was moved across the squares to represent its progress. There was plenty of good-natured rivalry with fighter-pilots and gunners, as bombs seemed to thread their way through the various defence belts and emerge into the barrage. Great care was taken to investigate kills and establish claims by various sections of the defence. Balloon Command Intelligence officers went immediately to the spot where a flying-bomb fell, there to establish on the spot the cause of descent or premature explosion. Decorations were received by the Command for the operation.

THE LAST ACT

The curtain fell on Balloon Command, as a separate entity of the R.A.F., on 5th February, 1945. It had been in action a few days short of five and a half years. The personnel of Balloon Command dispersed, although balloons could still be seen at Rhine Scheldt and Antwerp crossings during the final phase of Montgomery's advance.

The Command's activities during the six and a half years of its life are best illustrated by citation of two figures—two, out of a host of such totals. At its peak period the Command consumed eighteen millions of cubic feet of hydrogen each week. So great was the demand for this product that at the height of the Luftwaffe's attacks on Britain plans were made for the substitution of coal-gas for hydrogen. And to-day we learn that, since the outbreak of war, Balloon Command used 40,000 miles of steel cable—a belt that would come near to girdling the equator twice!

In his message of thanks to the disbanding Command, His Majesty the King said: "Your successes were a tribute to the thoroughness of your training, to the tactical methods you had developed, to the skilful technique you had devised and . . . to the work of the original auxiliary volunteers who had pioneered the way."

And then His Majesty used a sentence which will certainly be echoed in the hearts of millions of bombed Britishers, for he said: "In our cities and towns many lives and many homes owe to you their preservation."



Night Fighter's Jottings

By Flight Lieutenant W. Thomas Ingham

FEW days ago it was winter. To-day it is spring. Last week we moved into tents, grumbling at the mud and the cold. Now we are in the midst of a meadow thick with new grass and splashed with glowing patches of flowers—poppies, yellow daisies and stock. The vineyard next door was a wilderness of dead, black and twisted stumps. Now, under the tender hands of the peasant folk, the new green shoots are rising and the trees by the farmhouse where the sergeants live are in blossom. For all the wet fields and mists and grey skies we might have been back in Lincolnshire and not in Italy. But now there are blue skies and billowing white cumulus. It is exhilarating to fly again in a bright land.

"If winter comes can spring be far behind?" Spring had seemed very far distant when a Dakota had landed us—China and me—on a bleak Italian airfield and, surrounded by our luggage, we had stood in the rain wondering which way to turn. And then the darkness had come and we awakened the next morning to look through a gap where once there had been shutters and curtains at the amazing desolation of a town which the Hun had chosen to defend against the Allied forces, at the rubble of cheap concrete and hollow bricks, at the craters filled with water, at the swarm of glowering children throwing jagged stones at one another. looked beyond and saw the abominable bareness of a saucer-shaped plain fringed by its distant mountains intermittently hidden by driving rainstorms.

"Italia, O Italia!" Shall we ever forgive you the disillusionment of that bitter winter, its cheerless landscape, the destruction, the dispirited people and the squalour!

And now the magic of spring is with us and the air is alive with the whirring song of the crickets. You lie on the grass and the view is foreshortened. The lizards scurry away and for a moment appear like dragons. The line of the Apennines as the sun slips behind them is like some stage scenery set at the foot of the meadow. Their texture is velvet in the evening light and the colour of them the purple of the wine-tub.

The squadron has only a small programme for the night but the Bomber Boys are busy. The Wimpeys begin to take off in quick succession and we can see their long line of red and green lights moving up to the take-off position. Then comes the increasing roar above the

noise of the taxi-ing machines as they race along the runway towards us, the beat of the engines becoming more insistent and menacing. until they are airborne and pass safely over our heads with their load of "cookies." Soon the night air is full of the roar of engines, and navigation lights are making their way placidly across the sky. Someone says:

"The Wimpeys are putting on a maximum effort."

"More headache for the Hun."

"You on to-night, Doc?"

"No, thank you."

It is someone else's turn to wait for them coming back and to hope the casualties are

light.

A few fellows standing by are looking up at the sky and the impulse to fly is upon them. Some are thinking "Wish I were in Bomber Command." Others are thinking "Glad I'm not in Bomber Command." Not a cloud is in the sky and the stars are showing right down to the horizon. At such moments the glamour of flying is uppermost in the mind and the cold and the boredom of long patrols is forgotten. It is something belonging to a new world, an adventure elating, stimulating; it brings infinite satisfaction and a sense of achievement unspoken, unthought of, making a man a stranger in his own home, sending him in the middle of a question to the window to look up at a passing plane . . .

Now two of our Mosquitos take off. We know them by the different note of their engines. We curse them as they deliberately keep noses down and go "whang . . . whang" over our tents.

The darkness has come and there is a respite from the noise of aircraft flying—but, in a few hours, they will be back again, all circuiting the airfield and each taking turn to land; and people will be outside watching and, as each aircraft goes through the landing procedure, heads will be raised from pillows to listen for the change to fine pitch, for the soundhalf scream, half thud—of the tyres as they touch down and then, a little later, for the confident rev-up of an engine denoting that the machine is clearing the runway as it turns on to the taxi-ing track. The duty Medical Officer is watching and listening, listening for a bursting tyre and the crunch of twisting metal, watching for that dread flame that may quickly follow the belly landing. The C.O. is watching and

the Engineer Officer and the crews that man the ambulance and the crash tender and the cook who stands by the camp stove. It is the middle of the night but the camp is not really askeep.

A push has started on the Italian Front but so far it does not include us. One day we might be invited to take part in the war. A rival squadron on the other coast, report says, is having lots of joy. But not us; we are stooging. Farmer, a former pilot with the squadron, has just come to visit us. He is celebrating his D.F.C. We are "wetting" his ribbon for him when the telephone bell rings. John Barnsby and Taffy Hett have shot down a Ju. 88. But not an ordinary. 88, a special 88! The atmosphere has changed. This particular Jerry has been bothering us for a week or two with his very clever tactics and low-flying reconnaissance activities. We rush down to the flarepath to welcome the crew back, and fire a host of "greens" to let them know they are welcome. This is Taffy's first Hun; he is speechless but radiant. We retire to the bar and Farmer takes down a combat report in mock shorthand.

Yes, the spell had been broken at last and Binks and Duke got another 88 the next night and then a second shortly after. We lost, however, one of our best navigators when he baled

out over the sea.

Rennie did the first intruder trip to the Danube, Rennie (as often known as Jennie) and navigator Mike, and the German Radio News Service paid them the compliment of describing their sortie as "a medium bomber force which did some damage."

Rennie said he never thought to see the Danube this side of the war, but there it was broad and gleaming, winding lazily across its flat plain that stretches from the Iron Gates almost to the heart of Western Europe. Everything seemed mysteriously still and unreal, as it had been most of the way—across the empty Adriatic and the barren mountain ranges of Yugloslavia—and they were surprised, perhaps, that the river, the railways and roads were not bristling with activity.

"Are you sure that's it, Mike?"

River traffic—tugs and barges—was their primary objective, and they began a systematic search flying low and keeping the river between themselves and the moon. There was then apparent on the water a permanent moonpath which, keeping pace with the aircraft, lit up the nver from bank to bank and revealed in clear silhouette whatever was on its surface. Odd barges were noted moored close to the bank, but these were not attractive enough targets. At a section of the river where several canals had outlet they saw fair game. A tug steamer was drawing a train of three barges. They flashed past them, noting the exact point on the river, made a wide circuit so that they could attack up-moon, climbed a little and made a diving attack. Rennie pressed the tit. After what seemed a long time strikes showed in winking flashes along the tug and the first barge. Next moment they were flying past the target again, sweeping low over the trees and climbing to make another attack. It was too much to expect to be unnoticed any longer and searchlights held them for a moment and light flak began to come up from the shore as they made their second attack. They left the convoy stationary with smoke rising from two of the barges.

"Disappointing," said Rennie, "no flames!"

They turned further downstream and suddenly both cried out together, for there was a large concentration of barges, moored in pairs, in the lee of an island. Rennie gave a long burst along the whole line of barges and the aircraft was just above them when they started to explode in huge pillars of fire and series of Prince of Wales' feathers.

"Oo-er," said Rennie, as they turned to look back and saw the barges burning, their cargo of petrol and oil causing fountains of flame.

"Shall we give them another run?" (Really,

Rennie!)

Mike's comment was unprintable. He had already smelt brimstone and sulphur, he said.

They were sitting cheekily over a large town on the other bank of the river watching the progress of the fires and saw the roofs of the houses below lit up with the red glow. They looked at the great tower of thick red-black smoke and thought "Did we really do that?"

Mike said he felt like a schoolboy playing a prank which had got out of hand, and hummed phrases from "The Sorcerer's Apprentice" all the way back.

Were they shot at? They never noticed. But there were two good-sized holes in the elevator of their Mosquito.

The Danube show was a great success. Rennie went back again and again and most of the squadron collected several barges each as well as M.Ts. Beau Beverton, in a record trip, scored strikes on thirty-five barges, two tugs, and blew up an ammunition train. The Press gave the squadron a "write-up." It was while we were posing for some line-shoot photographs that someone brought a message. We were moving north immediately. China took the Hurricane to go and have a look at our new home. His was the first kite to land at the airfield after it had been cleared of mines. He was surrounded at once by men in strange uniform and speaking a language he did not know. For a moment he had misgivings and thought he must have landed at the wrong aerodrome and, in fact, inside enemy lines. They were Polish soldiers.

The next night we maintained a standing patrol over the Polish lines for Jerry bombers had at last been coaxed into the air. Four Huns fell in flames, to the great delight of the ground forces, and a fifth, claimed as "damaged," was afterwards found to have force-landed behind our own lines. Beau Beverton and John Jackson, whose team-work was sheer wizardry, shot down three in one sortie. Rennie followed the next night with two destroyed, one of them when his cannons had jammed and only two machine guns were left firing. It was a long chase. Jerry got into a panic as soon as he saw his own flak coming up towards him. He fired the colours of the day, illuminating himself long enough for Rennie to empty the two belts of ammunition into him. The Hun exploded as he went into the side of a hill. In less than a week at least one enemy aircraft had fallen to each of Griff, Fish, Jimmie Jones, Burns, Pat and John Mack. Jerry stopped his night raids. We had a Polish Vodka party and found next morning that flat surfaces had a tilted three-dimensional aspect.

"Gude nacht, Englander."

A crew of three young Germans were being driven away in a van to a prison camp. They were silent and never looked back, but stared gloomily at the floor of the van. I opened my

mouth to speak, but no words came.

"Good night, Englishman." It was ten years ago on the Rhine. I had left my friend, who was to stay longer in Germany and, on the way back, tramped close on thirty miles to the Lorelei Youth Hostel with its long climb to the top of the rock. The half dozen or more German youths of about my own age realized I was alone and must have noticed my weariness as I dropped into bed. After a whispered conversation among themselves they put out the light and speaking together in one voice bade me good night.

I lay a while, too tired to sleep, thinking how different were these sunburnt sons of Germany

from their English counterparts, how much less curbed by reticence. Something had happened that could never happen in a Youth Hostel in the British Isles. I thought of Karl Seeker from Bremen, who was also touring the Rhine. We had met several times during the last week. It was never a surprise to turn a corner to find Karl, a flush of pleasure on his face, coming to meet you, to shake you by the hand once again. I also thought of a schoolboy with whom I had talked the day before who, as we had stood looking across the river towards France, suddenly shook his fist and said "One day we will get our revenge." Yes, they were a different people.

"Gude nacht, Englander."

Now the van had turned the corner. Something about the hardness of their young faces made it difficult to form the words and "Good luck " was never said. Now I felt ungrateful, and kicked myself. Last night, in a running combat, they had been near to shooting us down. We ought to be grateful for that alone. Instead, we got them. They were forced to ditch their aircraft and a pretty ditching it was with less than half a moon in and out of cloud, while the rear gunner went on firing all the time to try and ward us off. They put up a good fight and when they were brought to shore this crew of little more than schoolboy age we congratulated them. They were suspicious, however, and a little frightened. They said little.

"We were the crew you fought with last

night."

Their faces brightened.

"And did you come down on the water, also?" they asked.

"No, our aircraft was undamaged."

Immediately their faces changed. They were disappointed and did not want to believe us-

They fell silent again.

Unwittingly we had made them believe that we were in difficulties when, in an effort to locate the exact position of their dinghy, we fired several signal cartridges. As they waited in the sea during the remaining hours of darkness for rescue and captivity they had consoled themselves that at least they had shot down a British night fighter. That was why the disappointment suddenly showed on their faces, but I did not realize it until the van had disappeared round the corner.

"Good luck, anyway," I said to the empty

roadwav.

With the Polish Air Force at Swinderby, Lincolnshire 1940-41

By R. A. ABBOTT

THE Battle of Britain was still very much "on" in late September of 1940. Even at the R.A.F. Equipment Officers' School, on the edge of the Lake District, we had had Nazi bombers passing overhead in daylight, as well as most nights on their way to Merseyside, and the months of August and September were for us not only a period of desk-study, physical and disciplinary training . . . conditions were such that we had been made into what might be called "auxiliary Commandos" too, just in case German paratroops might attempt to take the vital viaduct not far from the requisitioned hotel which was our training-chool. I was appointed a "Flight Commander," and on one occasion it was my personal lot to command a combined night exercise, designed to discover whether the viaduct could be taken by a small attacking force. . . . I believe the verdict was that it could be taken, although my force arrived there just in time to see the Very lights go up, signalling the end of the exercise!

Each morning we gathered around the loudspeaker at eight o'clock to hear how many enemy machines had been shot down by the R.A.F. during the previous day—60, 80, 100, 150, 180—it seemed almost incredible, and it certainly made us feel that we were only fakes, in our R.A.F. uniforms, without wings.

But there it was, or rather there we were, and we went on trying to learn about Form 600, how aircraft engines should be packed, and what should be done if we ever found ourselves in transit, carrying secret documents.

Those eight weeks were really quite strenuous in their way, but there was a lighter side to it all, and the eventual reward of knowing that after what seemed like years instead of weeks we were at last to go to real R.A.F. Stations as fully fledged P./O. Equipment Officers. . . . anyway, we would see operational aircraft, even though we could not fly them. At least, some of us would . . . some unfortunates would be posted to maintenance units, and perhaps never see an aircraft unless it were already in the sky, based somewhere else.

It was with considerable relief that I found I was posted to R.A.F. Swinderby. True, noone knew where Swinderby was, and I was one of the last two P./Os. to leave Grange-over-Sands that day, waiting around while frantic efforts were made to establish the location of this R.A.F. Station, Swinderby. The final decision was that Swinderby was in Yorkshire, and that two P./Os. were to go there, not just one. We just caught the train, together with the other 120 newly qualified officers, and after various changes found ourselves at Nottingham, where the railway officials informed us that Swinderby was in Lincolnshire, not Yorkshire, and that the next train would be to-morrow morning, Sunday.

We stayed overnight at a hotel I had known well when a civilian, and we were both more or less surprised to find we could actually telephone this R.A.F. Station, Swinderby . . . they did not seem to know anything about us, but at least we now knew that they really existed, and someone in the hotel told my colleague that Swinderby was a Polish station, operated by Polish bomber squadrons, with a Polish Group Captain commanding the station. The whole thing sounded faintly Ruritanian and unlikely, but we would soon know . . . we would keep the R.A.F. flag flying, if only at the Equipment Stores . . . and yes, there was the sound of the siren, just in case we had forgotten there was a war on. We might even fight on the beaches and in the fields before very long . . . the coast could not be so very far from Swinderby, and it was the East Anglian coast at that.

Somehow, the Group Captain disappointed us . . . we certainly were not disappointed to find that he was a British officer, but we were somewhat chilled when he said "Well, we've already got two Equipment Officers; I don't know what we want with four . . . still, it will no doubt be good experience for you . . . before you move on!" Perhaps he meant that we would be given away to the "bomb dump" we had seen near the railway station? The Flight-Lieutenant who commanded it had seemed to think he could use us, when we reported to him by mistake. But we didn't want to work at the "bomb-dump" when here was a real operational station . . . this business about moving on was not what we had hoped for, but once again there we were, and there was nothing we could do about it.

The Station Commander soon decided what to do with his four Equipment Officers. It was not long before a certain knowledge of musical and entertainment matters shown at Grange marked me out for the job of Station Entertainments Officer. On a new station like Swinderby, carrying two bomber squadrons and satellite personnel, the entertainments job, to be done at all well, was just about a full-time enterprise. Thus, with the posting away of the Senior Equipment Officer, and my pre-occupation with entertainments, the Group Captain's problem was solved . . . where there had been four little equipment boys there were now in theory three, in practice two and a fraction.

My career in Swinderby entertainments got off to a shaky start. The first show I arranged (N.A.A.F.I./E.N.S.A. films) brought a full house, from the Station Commander down to A.C.'s Joe Soap and Jerzy Petrovsky, but it lasted only about three minutes, because a lone Nazi chose that time and evening to drop a stick of six bombs right across our airfield. He caused little damage, but ruined the Sunday evening film show. During the next five months we were bombed more than once, but the Nazis showed rather more consideration for Swinderby's leisure, and in the course of my duties in both entertainments and equipment I came to know all ranks fairly well, both British and Polish.

In September, 1940, numbers 300 and 301 (Polish) Bomber Squadrons were flying Battles, aircraft already to all intents and purposes obsolete, and the Poles who flew them were just living for the expected Wellingtons to arrive at Swinderby. Meanwhile, they did the best they could with what they had, and night after night they crossed the Channel to bomb the "Invasion Ports," the French, Belgian and Dutch coastal regions where Hitler was thought to be massing his landing-barges for the attack on Britain. Most of the Polish officers spoke German and they took a special delight in tuning in to the German Home Service radio on the evening after they had made a raid, just to hear what the Nazis had to say about their handiwork, and that of other R.A.F. squadrons. I often joined their listening-circle, still a little uneasy in my mind about this listening in an R.A.F. Officers' Mess to the German radio. There was nothing against it, of course, but in 1940 it still seemed strange to me, in my blue uniform, to which I was not yet thoroughly accustomed.

At that time few of the Poles had been more than two or three months in England, and although some of them spoke English fluently the majority were still in the early stages of learning to speak our language. The fact that I spoke some German and French helped me to get to know them rather more quickly than was possible for some of the other British officers, and I began to pick up a few Polish words and phrases.

At first many of the Poles tended to sit around together at the far end of the room, too shy and too polite to take chairs round the fire, where we were comfortably installed. As their knowledge of English improved so the Officers' Mess became one group, instead of two, and during the same period the Mess itself became a quite luxurious place, instead of the rather bare set of rooms it had been in

September.

Swinderby was the first R.A.F. Station to be built and completed entirely since the outbreak of war. It thus had many modern features not found in some of the older stations, and by charging high messing fees, getting the usual grant from Air Ministry, and having the bargaining-power of our large Allied contingent to influence various Comforts committees, we soon had almost everything we could reasonably hope for, even to a magnificent Bechstein grand piano, donated by a titled benefactor.

Not only the Officers' Mess but the whole station became a very comfortable place, also a happy one, with remarkably little friction between Poles and British. No little credit for this happy state of affairs was due to the two Polish Wing Commanders, both well-travelled and cultured men, as were most of the senior Polish officers. As for the more junior Polish aircrews and the ground-crews, they were filled with an intense patriotism, and when the squadrons were converted to Wellingtons in November, 1940, their pride and energy knew no bounds. Their target-date was now the night which they all hoped and prayed would not be far distant—their first raid on Berlin. It so happened that this first Berlin raid did not take place until after I myself had left Swinderby, but I was told that for this supreme occasion the crews drew lots, to determine who should and should not have the honour of taking part. That raid brought heavy casualties to the squadrons.

Polish pride sometimes caused embarrassment to us in the Equipment Section, and to their own engineer officers. In 1940 and 1941 aircraft spares were so scarce that every item had to be even more carefully watched than is normally the case, while at the same time the shortage of operational aircraft was such that maximum serviceability was not merely a desirable aim, but a stark necessity. The Equipment Officer had each day to signal to H.Q. Bomber Command and to Air Ministry full details of which aircraft were unfit to fly, and the cause

of the unserviceability. In theory that was not a difficult job, given the co-operation of the engineer officers, and of the ground crews. At Swinderby it was a rather different matter.

Aircraft No. 4965 might be grounded, say, excause of a faulty artificial horizon. The fact would be noted on the daily signal and a new instrument would be sent post-haste from a maintenance unit or other source of supply. Before the new instrument arrived aircraft 4965 would be serviceable again, but aircraft 4972 would be on the unserviceability list, because of a faulty artificial horizon." Then 4972 would be serviceable, but an aircraft in the other squadron would be grounded with similar trouble. The Polish ground crews could not be bothered to wait while a part was sent from a maintenance unit; they could not waste bombing-hours on their own precious aircraft like that—they would just go along to another aircraft while no one was looking, calmly remove the part required, substitute the faulty one. The aircraft they personally looked after were the only ones which mattered. They made excellent fitters and electricians; we had to admire their keen spirit, but we also thought and said unkind things about them at times. Yet we were usually won over by the extreme politeness and charm, which even the lowliest Polish A.C. nearly always showed.

Another difficulty, a more serious one, was to convince the Poles that the R.A.F. would very much rather lose an aircraft than lose a highly trained crew. The Poles showed extreme reluctance to abandon an aircraft in the air, and would take the limit of risk with their own lives before they would bale out. This attitude was partly sheer pride and personal bravery, partly a legacy of their service in Poland, where a good aircraft was much rarer than a good crew. Then again, their mercurial temperament sometimes resulted in their battling through to their target against heavy odds, only to lose themselves when safely over England on the return journey. Weather was often the reason for their landings at airfields far from Swinderby, but it certainly was not always the reason. It really appeared to be a question of national temperament, and this fiery yet rather unstable trait seemed to indicate greater natural ability as fighter-pilots, rather than as bombercrews. Certainly, in almost every theatre of combat from the Battle of Britain to the 1944 D Day, and since, the record of Polish fighterpilots has been consistently just about secondto-none.

All the world knows that the Poles possess great artistic ability and that they dearly love

music and song. They always formed a large part of the audience for the E.N.S.A. and other shows in the Camp Theatre, and it was very noticeable that, though they might understand very little English, and so at times could not possibly understand what was being said, their enjoyment was entirely genuine, their reaction spontaneous. Music was in their blood, and very soon there was a Polish choir ready to takes its place in the Swinderby Station Show. We whose job it was to organize the show found a certain difficulty in arranging rehearsals which would include the choir, but that question was amicably settled by allowing them to rehearse on their own. Although we sometimes feared the worst it was always "all right on the night," as far as the Poles were concerned.

There was a Polish A.C. who claimed that as a violinist he had toured most of the Central European capitals in the years before 1939. He was very keen to figure in our show, and burst into tears when he discovered that we reluctantly thought of leaving him out, partly because of his rudimentary knowledge of the English language, partly because we did not think he was really a good violinist, anyway. He begged to be included, and when the show went on he was one of the biggest personal successes, for he was a much better artiste, an unconscious comedian, than anyone had anticipated and he certainly worked hard.

Also well-known in England since 1940 is the way the Poles have with the ladies. I can vouch for that, for I had what looked like proof, gathered in a rather unexpected way. We decided to hold an Airmen's Dance, just as an experiment. The only ladies at Swinderby were three W.A.A.F. cypher officers and six N.A.A.F.I. girls. There were several hundred airmen, most of them Polish. The dancing partners would have to be imported, and security regulations made it necessary that they should be "ladies in uniform."

I discovered which local R.A.F. stations and Army camps had W.A.A.F. and A.T.S. personnel, and set about contacting the women officers in charge of the various contingents to ask whether they would send bevies of girls to our dance—we would provide transport, if necessary.

The first reaction was disappointing. The women C.Os. said that though they would post details of the Dance on noticeboards they felt that Swinderby was rather far away, and that in any case they did not wish their girls to be going out to dances night after night, what with the "black-out and the "blitz," and one thing

and another. They would do their best, but I was not to expect a large attendance.

The first dance drew about eighty girls from five stations and camps, and it seemed to me that "a good time was had by all." The second dance brought about 140 girls from the same stations and camps, and an even better time was had. From then on I did not have to issue invitations to the Swinderby dances—the W.A.A.F. and A.T.S. C.Os. would ring me up, asking when the next dance was likely to be, because "the girls seem to enjoy coming to Swinderby so much." I noticed that where one woman officer-chaperone used to accompany a party of girls, three or four would come, and it was necessary to relax the rule that only six officers from Swinderby should attend any one dance—someone had to entertain the W.A.A.F. and A.T.S. officers, and the Airmen's Dance began to look more and more like an All-Ranks affair. I was sure the Poles had a lot to do with all this, and in the Swinderby area there was considerable surface jealousy among the Other Ranks regarding girls. The Army said that the R.A.F. had all the luck; the British R.A.F. complained that they stood no chance against the Poles. My private opinion was that all concerned were doing quite nicely, thank you, but stories about the amorous exploits of the Poles were many. Swinderby's classic " was of the two Polish sergeant-pilots who drew their pay one Friday (about £9 each), went into Lincoln, came back next morning with the sum of 1s. 9d. between them-how they had spent £18 in so short a time was quite a story in itself.

There was no doubt that the Poles, officers and men, were fond of the grand gesture, and this led to some criticism of their driving big cars, frequenting expensive hotels. This was true, but misleading, for I knew from my own observation that a Polish officer would sit every evening for a fortnight or more in the Mess, drinking little or nothing, then one evening he would "break loose." Similarly, Polish officers would keep their cars in the garage for long periods between excursions.

The Poles were extremists in most things. When they drank they drank gin or brandy as if it were water. When they were feeling happy they were the happiest of mortals; when depressed they reached depths incomprehensible to us who were British. Most of them had adequate reason to be depressed when they thought about things. Not only were they in a foreign country, they had been going from one country to another for more than a year since Poland was over-run... Rumania, Palestine, France,

England. Not only were they away from their families, but it was dangerous for their families should they try to communicate with them. In many cases they had no idea where their families might be. Their country had been occupied not only by the Nazis but also by the Russians; thousands of Poles had been carried off, not only to Germany but to distant parts of Russia. Between the Germans and the Russians they had in most cases lost everything they had possessed in 1939, and their only hope lay with Britain.

I shared a room with a Polish officer who, as a boy, had experienced the Russian Revolution of 1917-18, had lived in Germany and in Paris. There was just one thing about which we disagreed, and that one thing was the question of Russia. Even in the idealistic atmosphere of 1940 the future of Poland was clouded by question-marks, and whatever happened it seemed that Poland must lose. The Poles themselves had few illusions about that, but they just hoped that by some miracle Britain would see them through.

That was partly why they shed their blood without question, with us and for us. Partly also it was because the Poles were and always had been a warrior nation, accustomed to horrors unknown to us, a race that continued to exist through the centuries only because of its immense vitality and its obstinate refusal to succumb to foreign overlords, whoever they might be—Germans, Austrians, Russians. Not without reason had they been called "the Irish of Eastern Europe." Their nationalism was as strong and as blind as that of the Irish had ever been.

I learned to play their National Anthem, as well as their favourite drinking-song, "Stolat." When they sang their Anthem it was impossible not to sense the fanatical strength of their national feeling . . . it has always had to be reckoned with in the past . . . it will have to be reckoned with in the future. The Poles said proudly and with truth that in only one occupied country of Europe had Hitler been unable to find a Quisling—that country was Poland.

Just one month ago, in Naples, I saw on many walls a striking poster carrying the slogan alternately in English and Italian—"For Your Freedom—and Ours!" The design was a series of flags, one above the other, each marked with the name of a battle in which Polish forces have figured during this war—Poland, Narvik, France, Battle of Britain, Battle of the Atlantic, Tobruk, Alamein, Tunis, Catania, Monte Cassino, Caen, Arnhem—these were some of the names mentioned. In a corner of the poster I

read that it was published by the Polish Information Bureau.

The implication was clear. For the Poles it might be true that "all is lost save honour."

However that might be, the Italians as well as the Allied troops should at least be given the outline of Poland's glorious tragedy as it has unfolded since September, 1939.

The First R.A.F. Troopship

BY WING COMMANDER C. R. STRUDWICK

OW that the thoughts of so many of us are concerned with service overseas, it may be of interest to some to hear what trooping was like in the early days of the R.A.F.

Shortly after the last war it was decided that in view of the many commitments of the R.A.F. overseas, that Service would carry out its own trooping independent of the Army, and in consequence of that decision at least one transport ship was hired for the exclusive use of the R.A.F.

Feeling that it was the thing to do, and having barely reached the age of discretion, I volunteered for service in India. I had just got married and remember what a thrill it gave me when asked if I wanted a passage for my wife. Up till then—the last war was only just over—the Air Ministry, and indeed the Army, had refused to recognize the existence of wives. This was the goods, I thought. This was in the best tradition of peace-time service.

In due course, having gone through all the business of inoculation and vaccination, much as it is to-day, we were ordered to be at Southampton by the evening of a certain day in November.

I shall never forget our feelings of dismay when we first caught sight of the boat that was to be our home for the next thirty days or so. It was the old s.s. Assaye, one of the last coalburning wooden ships ever to be seen in service. Rumour had it she was trooping in the Crimea and she was certainly old enough to have done so. She was barely 7,000 tons displacement and alongside the other ships lying at Southampton she looked tiny, so much so that some wag asked if we were expected to help row it. However, we were cheered by the sight of the R.A.F. wings and crest stretched right across the front of the bridge, a good idea that; she may be small but she was our own.

On reporting to the embarkation officer we were told we had been allotted an outside cabin on the boat deck. We could hardly believe our luck and hurried aboard in case somebody more senior should take possession. Yes, there it was all right, a two-berth cabin, one bunk above the

other, a washbasin with running water, a small wardrobe and, more important still, a porthole all to ourselves. We hugged ourselves with delight; everything seemed lovely. We had reason to think otherwise before that journey was finished.

Everything was lovely while the cold weather lasted but directly it began to get warm, as it does after entering the Mediterranean, the decks became crowded with airmen who, from early morning till late at night, played the time-honoured game of "House," the largest school, or so it seemed, always being directly under our porthole. Even to this day, both my wife and I can remember distinctly the names given to all the numbers on the "house" board—" clickety click," "Kelly's eye," "top of the house," etc., etc., while the language that came through that porthole was nobody's business. It was certainly possible to look out of that porthole, but it was also possible for any inquisitive but unsuspecting airman to look in! It must be remembered that when the ship entered the Red Sea it became so hot that it was necessary to keep the porthole open if conditions in the cabin were not to become unbearable.

The Air Force was so small in those days that it is hardly an exaggeration to say that one knew—or at any rate had heard of—every officer in it even down to the most junior, so we were like one big family. Concerts and dances took place as a matter of course. All I can remember of the concerts was a certain officer, now a famous Air Marshal, reciting with great pathos "A Broken Down Actor." Where he got the top-hat from will remain for ever a mystery. This part of his act was received with polite, if restrained, applause, but his pièce de résistance was another monologue entitled "One shirt from Southampton to Basra Bar," and this brought the house down, and for a very good reason. Officers had to wear mess kit in the evening, which meant, of course, a boiled shirt. There was no laundry on board and, consequently, no hope of getting dress shirts washed. Few of us came prepared for this.

Of the dances, quite a number were fancy

dress affairs and the ingenuity of the average R.A.F. officer and his wife in making costumes from literally nothing but bits of bunting and paper was never more strikingly displayed.

An amusing incident that remains in my memory was when a number of officers, Old Etonians, conceived the idea of holding an "Old Etonian" dinner and placed a notice on the board asking for names. Not to be outdone, the lowbrow members of the company suggested holding an "Old Borstalian" dinner and also put up a list asking for names. These dinners actually took place and on the same evening and in the same saloon; the dresses and behaviour of the "old Borstal boys" caused great amusement. One young officer, now a much decorated senior officer, refrained from shaving for several days in order to look the part. The crew's quarters must have been raided to obtain all the red handkerchiefs used as neckwear and also the extremely filthy cloth caps.

Further effect was obtained by members of the party by the exchange of clothing, tall men wearing short ones' clothing and vice versa.

Our first port of call was Malta, although nobody was allowed to go ashore there. We were there half a day only and spent the time watching the native boys diving for coins. We must have been a profitable audience, because they very soon refused to dive for copper coins, making the excuse that they could not see them in the water.

After that, Port Said, where we stayed for nearly two days and where all ranks were allowed ashore. Simon Arzt (the Harrods of Port Said) must have done a roaring trade that day. Coaling took place here and well we knew it—one breathed, ate and drank coal dust. The coal was actually carried on board by native women in flat baskets carried on the head, and very graceful they looked walking up the fairly narrow gang planks seemingly unhampered by their long-flowing, if filthy robes.

It was at Port Said where we lost the first of our passengers. Officers, nursing sisters and airmen went ashore bound for Ismailia, Helwan, Heliopolis and other romantic-sounding places which were just then coming into the news, and which have been the scenes of much Air Force activity ever since. Reliefs also left us for Palestine and "Mespot," which about this time had, at the instigation of our present Prime Minister, been restored to its ancient title of Iraq.

Of the Suez Canal and Red Sea I remember nothing except the intense heat and our first experience of tropical nights. The airmen suffered greatly from the heat; although wind scoops were erected and everything possible was done to keep the air circulating, very little cool air reached the airmen's sleeping quarters. As many as possible slept on the decks, but there was room for only a fraction of our numbers.

We were fortunate in seeing that odd sight of another ship in another part of the canal having all the appearance of sailing on the sand.

We lost some more passengers at Aden and listened with great interest to the first officer's story of the two army majors who lived alone on Perim Isle; apparently these two officers found life so pleasant away from female society that they decided to spend the rest of their days there. Whether this was a true story or just a seaman's yarn I have never been sufficiently interested to find out. I only know that no inducement, with or without female society, would get me to live there a second longer than I had to.

The next five or six days were spent sailing along the Arabian coast. This, I think, was the best part of the journey; the days were hot, long and lazy and the sea calm. There was the usual one parade in the morning and, except for the occasional lifeboat drill, the rest of the day was your own, unless of course you were detailed for any orderly duty. Deck tennis courts were rigged up on the decks, the hours for using them being divided between the officers and the airmen. Competitions and tournaments were strated, the highlight being a match between the officers and N.C.Os. As there was little else to occupy our attention this match assumed great importance, the players being picked with as much care as that given when Chelsea play the Arsenal.

Thus the days passed till we reached the top of the Persian Gulf and dropped anchor outside Basra Bar; here more than half of our passengers were disembarked into river tugs to be taken further up the gulf to Basra itself. We were due to take on a fresh load of passengers for shipment on to India and the Far East and, while waiting, a shooting party was organized by the captain of the ship, or the Master, to give him his proper title. Quite a number of officers were taking sporting guns out with them so there was no lack of guns and ammunition; all that was lacking was something to shoot at. Lured on by stories of duck and snipe the party walked mile after mile over heavy sand; they even spent the night away from the ship, but only one shot was fired, and that in despair at a pelican flying at an enormous height over the party. To everyone's staggering surprise it was hit and came down a whirling mass of neck, legs and white feathers. It was brought back on board, more in the nature of evidence; it was useless for anything else.

We were soon steaming back down the Persian Gulf, with the ship full to capacity again, and within a week had docked at Karachi and there started a tour of duty for which most of us had volunteered and which few of us ever regretted.

That briefly is a journey out East in a troopship during the early days of the R.A.F. The journey was leisurely, there were few dangers, certainly none from enemy action, and the weather, once the Bay of Biscay was passed, was never really bad. I suppose in the not-too-distant future all trooping will be done by air. When that happens, passengers still certainly get there quicker and doubtless have more comfort, but, compared to the journeys made in the old Assaye, they will miss an awful lot of fun.

Sea-Air Saga of the Merchant Navy

O story of the war reflects more heroism and daring than the saga of the Merchant Navy, of which an official account has just been released.*

For the first time there emerges the overall part which aircraft have played in sea convoy protection. Undertones to the beat of the ships' propellers—there are between 2,000 and 3,000 Allied ships at sea every day—are the whirr of the airscrews from land-based and carrier-borne aircraft in escort.

To date more than 9,000 convoys have already safely entered or been cleared from British ports. Records show that R.A.F. Coastal Command aircraft alone have escorted more than 6,000 merchant convoys in addition to purely naval convoys and independently routed ships. These aircraft have made 1,500 attacks on U-boats.

CAMSHIP VICTORY

The official account reveals the remarkable extent to which aircraft designed for land operations were used at sea. Outstanding among these change overs is the employment of Hawker Hurricane fighters against enemy long-range reconnaissance aircraft whose duty was to report ship movements to U-boats.

The Hurricanes were mounted on catapult ramps fitted to "Camships," the consolidated term for the official title of Catapult Aircraft Merchantmen. On the appearance of the enemy reconnaissance aircraft the Hurricane was shot off the catapult and sent in pursuit. The pilot, after battle, could either return to a land base or else had to make a landing in the sea.

First success in these tactics came on 3rd August, 1941, when a F.W. Condor was attacked and shot down some 200 miles off Cape Finisterre, after the Hurricane had been

airborne only nine minutes. By 1942 the prowling Condors had virtually been shot out of the ocean skies.

CARRIERS INTO BATTLE

New methods for the tactical employment of aircraft carriers were likewise devised. A major innovation was the decision to build escort carriers—"flat-tops" which were essentially no more than flying platforms at sea. With these open-sea bases available, the Fleet Air Arm found a method of beating the U-boat. This consisted of pairing a fast cannon-armed fighter with a Fairey Swordfish carrying depth charges, anti-submarine bombs or torpedo.

The plan of attack was simple. If the U-boat remained on the surface with the intention of fighting it out with the aircraft, the fighter went in to attack first, raking the decks with cannon and machine-gun fire until the U-boat A.A. defences were silenced. Then the Swordfish could complete its mission without interference. In a large number of instances the submarine was sunk or forced to surrender to nearby surface escort craft of the Royal Navy.

CONVOYS TO RUSSIA

British escort carriers aircraft were also used to defend merchant convoys against land-based attack. On the 2,500-miles convoy route from Britain to Murmansk, attack could be expected from at least 350 aircraft based on airfields tucked away in the Norwegian fiords. Most important engagement on this route took place in September, 1942, when in a two-day battle Fleet Air Arm Hurricane fighters shot down five torpedo bombers, probably shot down three others and damaged fourteen more, for the loss of four Hurricanes, from which three pilots were recovered.

Importance of this duty can be seen from the cargo delivered to Russia. The first convoy,

[&]quot;Merchantmen at War." Published by H.M.S.O. Price, 1s. 9d. net.

in August, 1941, delivered 64 aircraft and 15,000 tons of other military cargo. Other convoys had, before the end of 1941, raised the total then to 799 fighters and nearly 100,000 tons of other military cargo, as well as 572 tanks and 1,404 vehicles. By the end of July, 1944, 3,200 aircraft had been despatched from Britain to North Russia.

Some of the hazards, of a purely flying nature, in these northern waters may be gauged from the fact that the few seconds it takes to range an aircraft from its internal hangar to the flight deck of a carrier are sufficient in certain weather conditions to have the aircraft's wings covered with ice. It is on record that a Supermarine Walrus amphibian biplane on duty in these parts was forced to alight on a calm sea due to ice overload on the wings, and, unable to take off again, taxied during six days on the water to reach Murmansk, where it later went into service on anti-submarine patrols.

Aircraft protection was introduced in the opening days of the war from British aircraft carriers. The famous *Ark Royal* used its aircraft to sweep some 7,250,000 square miles of sea in the first four months.

DELIVERED BY SHIP

Vicious air attacks by Italian and German aircraft on the convoys to Malta were frustrated by the ships' A.A. defences and aircraft from the carriers. In June, 1942, Hurricanes shot down some thirty attacking aircraft, and in August, 1942, in a bitter battle, fighters from the British carrier *Indomitable* shot down thirty-nine enemy aircraft out of 260 that had attacked during long hours of fighting.

In addition, Spitfires and other aircraft for the relief of Malta were flown from the deck of carriers positioned in the Western Mediterranean. By autumn, 1942, 815 aircraft had been flown into Malta, in a total of thirty-five delivery operations of this kind.

A broad indication of the magnitude of British aircraft production is implicit in the figures of aircraft carried overseas in merchant ships. Despite the urgent claims on aircraft based on Britain for the mounting air offensive against Germany, and even during critical phases of the war, large numbers of aircraft were shipped overseas, in addition to those with sufficient range to fly direct to such posting points as Gibraltar.

Extra to the Russian deliveries cited above, during the twelve months ended March, 1943, 600 aircraft were delivered by ship on the Cape route to the Middle East, and 2,200 fighters and bombers were shipped to Takoradi, Gold Coast, for the long flight across Africa. In the stirring days of the North Africa landings (October-November, 1942) a further 394 aircraft were shipped to bases there, whilst 1,416 more were shipped to Gibraltar for assembly and then flown on.

With the Russian figures, the official account thus details oversea delivery of 9,810 aircraft by merchant ships alone—a figure which looms the more impressive when it is recalled that the "first-line" strength of the home-based Royal Air Force in 1939 was officially named as less than 2,000 aircraft.

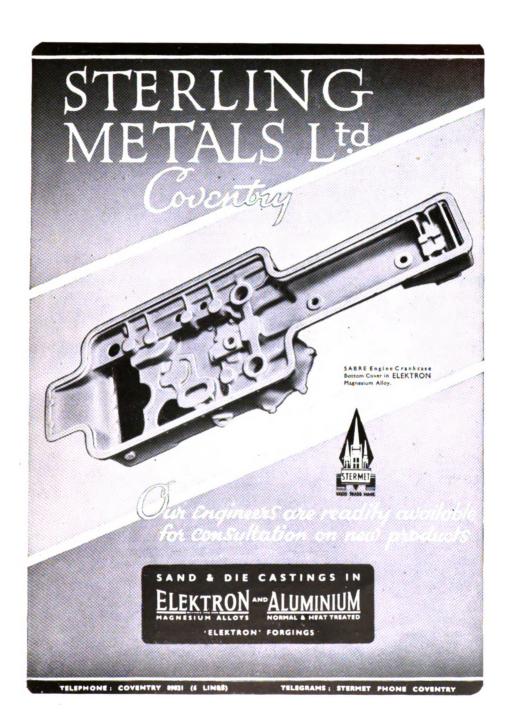
ADAPTABLE AIRCRAFT

A wide diversity of British aircraft have been turned over to sea-air operations. On continuous patrol duty since the beginning of the war has been the Short Sunderland four-engined flying-boat, powered by Bristol Pegasus engines in its early versions. Handley Page Halifaxes and Avro Lancasters, mainstay of the Bomber Command offensive, have been used for special sea missions. In sweeping the seas on a 1,000-mile radius in the sector from the Bay of Biscay to Iceland and the coast of Norway, long-range Vickers Wellington and Armstrong Whitworth Whitley bombers have performed yeoman service.

Closer to land, Avro Ansons and Handley Page Hampdens were early in the war diverted to reconnaissance and escort patrols over the sea. Lately, the Bristol Beaufighter, in its torpedo and rocket-firing versions, has completed brilliant attacks against enemy shipping hugging the North European littoral, whilst perhaps the most outstanding sea-air feat of the war—the sinking of the Tirpitz—was made by Lancaster bombers carrying 12,000-lb. armourpiercing bombs.

Implicit in these sea operations by aircraft originally planned for duty over land is the reliability of the Rolls-Royce and Bristol engines. It is quaint to recall that in pre-war days official regulations required R.A.F. land-type aircraft making flights over the sea to be at such a height that they could glide back to land should the engine fail!

Printed and Published in Great Britain by GALE & POLDEN LTD., Wellington Works, Aldershot. Overseas Agents, INDIA: THACKER, SPINK & Co., Calcutta and Simla. THACKER & Co., LTD., Bombay. Higginsothams, LTD., Madras and Bangalore. CANADA: Wm. Dawson Subscription Service, LTD., 70, King Street East, Toronto, 2 Canada. AUSTRALIA and NEW ZEALAND: Angus & Robertson, Ltd. SOUTH AFRICA: W. Dawson Sand Son (S.A.) Ltd., 29 and 31, Long Street, Capetown.





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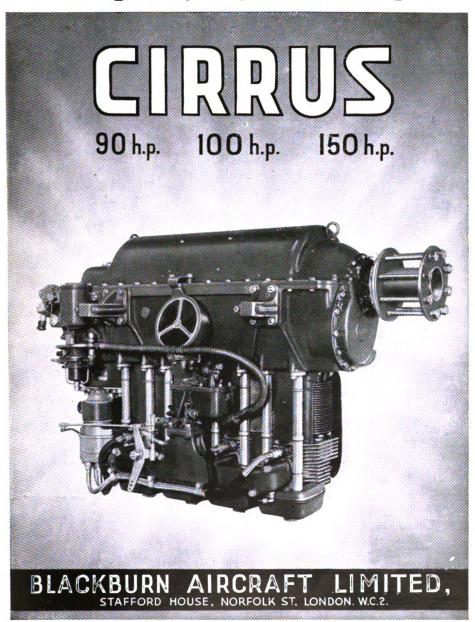
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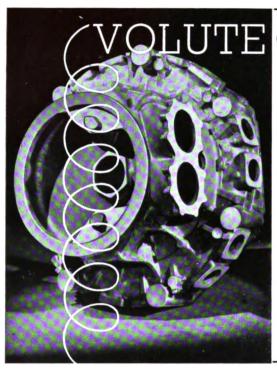
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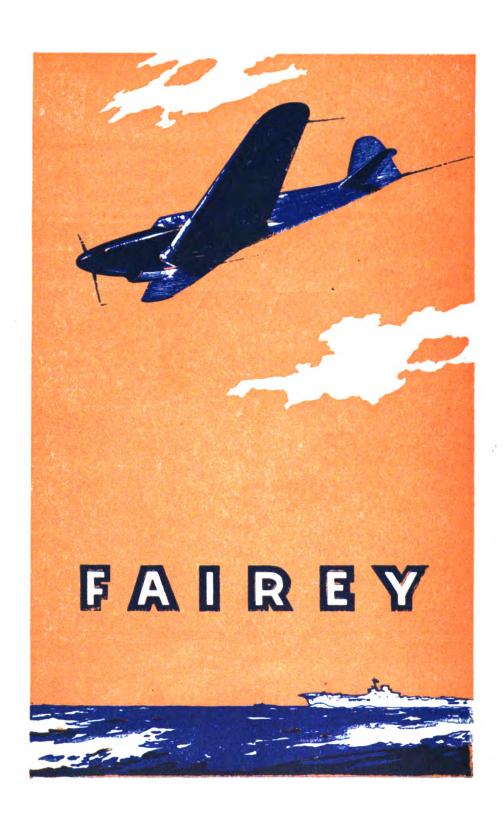
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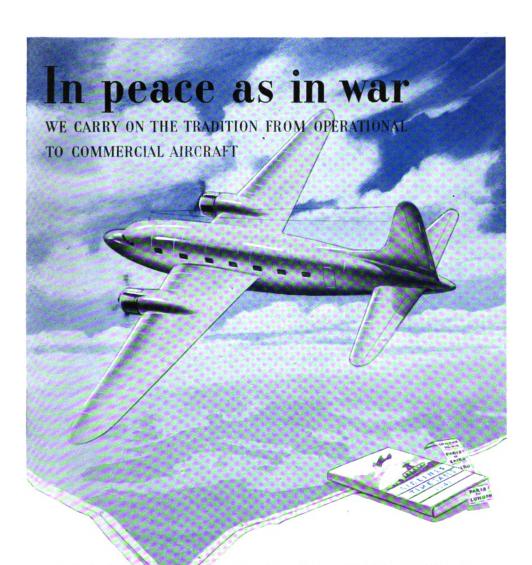
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EDITOR:

WING COMMANDER C. G. BURGE, O.B.E., q.s., R.A.F. (Retd.)

Assisted by an Advisory Committee of Members of the R.A.F. and Air Forces of the Dominions

VOLUME XVI

SEPTEMBER, 1945

NUMBER 4

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Introduction

THAPTER VIII of the Dumbarton Oaks Charter sets out various methods to be employed to deal with a potential or actual breach of international peace. Under these arrangements certain quotas of national forces are to be made available in order that the military sanctions may be applied if necessary. In particular, so as to enable urgent military measures to be taken, there are to be held immediately available national Air Force contingents for combined international enforcement action. If these international air contingents are to function effectively, the Governments concerned must arrange in normal times for such co-operation as will enable the contingents to act speedily and adequately should an international crisis arise.

The substantial community of sentiment in the field of training, in the field of operations, and in the general comradeship between the Dominion Air Forces and our own, existing long before the war, has been strengthened and substantially enlarged during the war to the extent almost of creating a unified Commonwealth and Empire Air Force

In addition, in this war, there has been built up in this country an International Air Force comprising the Royal Air Force and the Air Forces of our Allies—Norwegian, Dutch, French, Belgians, Poles and Czechs. The community of sentiment in all the essential factors making for close co-operation, comradeship and swift action, exists between these forces and our great American ally, whose organization and ours are practically the same to-day.

SUBJECT No. 1

The Commonwealth and Empire Air Forces and Allied Air units at present serving with the Royal Air Force are fully integrated with the latter. They are organized, trained and operated on an almost identical basis. How far can this close integration in its present form be made a common object of our policy and contribute to the carrying out of projects for securing peace?

SUBJECT No. 2

Mobility is an essential element in the defence of the widespread commitments of the British Commonwealth of Nations and Empire, and for combined international enforcement action. Discuss the part that air forces might

play in these spheres and the effect that the proposals might have on the existing responsibilities of the three Services.

SUBJECT No. 3

Discuss the effects that the rocket (including all rocket-propelled projectiles) and pilotless aircraft are likely to have on warfare generally and the extent to which they are likely to affect the defence of the British Commonwealth and Empire and the international air contingents envisaged above.

CONDITIONS OF COMPETITION

The competition is open to all ranks serving in the Royal Air Force, including members of the Allied Air Forces serving therewith, and the Air Forces of the Dominions.

Length of Essays. Each competitor is required to write an essay on only one of the above subjects of his own choosing. He may, however, enter an essay on each subject if he so desires.

Each essay must not exceed 8,000 words.

ALLOCATION OF PRIZES

1st Prize.—For the best essay in all three subjects, £40.

2nd, 3rd and 4th Prizes.—For the next best essay in each subject, three prizes each of £20.

Other Prizes of a Total Value of £25.— These will be awarded to any other essays which the adjudicating committee considers are deserving of an award.

ADJUDICATING COMMITTEE

The adjudicating committee will consist of three serving officers of Air rank.

RULES FOR SUBMITTING ESSAYS

Essays must be sent by registered post. No name or other indication of who the author of the essay is must appear on the essays, which should be placed in a sealed envelope marked "R.A.F. QUARTERLY Prize Essay Competition" and inserted in another envelope addressed to THE EDITOR, R.A.F. QUARTERLY.

The name and address of the competitor is to be inserted in a small sealed envelope attached to the inner envelope containing the two copies of the essay. These envelopes containing competitors' names will not be opened until the essays have been adjudicated.

Essays should be typed, but if this presents any difficulty they can be submitted in handscript providing this is legible. Closing date, 31st December, 1945.



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EDITORIAL

World Affairs

The Potsdam Conference

THE Potsdam Conference was not a Peace Conference. It was a conference between the three Powers which had conquered Germany, convened to determine, in some detail, the manner in which Germany should be controlled in the immediate future and, more broadly, the procedure for making peace settlements and for restoring Europe.

An official communiqué containing the resulting agreements was published simultaneously in London, Washington and Moscow on 2nd August, 1945. The full text of the communiqué, which should be studied by all who are professionally interested, contains about 6,000 words. It is reprinted in full in this number. Before commenting upon it, we give a brief summary of the principal decisions.

- 1. Peace Settlements. A Council of Foreign Ministers representing the five principal Powers (the U.K., the U.S.S.R., the U.S.A., China and France) is to be established with the express purpose of drawing up peace treaties, first with Italy and afterwards with the other satellite nations: Hungary, Rumania, Bulgaria and Finland. This Council is also to be entrusted with the duty of preparing, later on, the peace settlement for Germany, "to be accepted by the Government of Germany when a Government adequate for the purpose is established." The Council will usually meet in London, where its Secretariat will be established. Its first meeting is to take place on 1st September, 1945.
- 2. CONTROL OF GERMANY.—It is the intention of the Allies "not to destroy or enslave the German people" but to give them "the opportunity to prepare for the eventual reconstruction of their life on a democratic and peaceful basis"; and that they shall, by co-

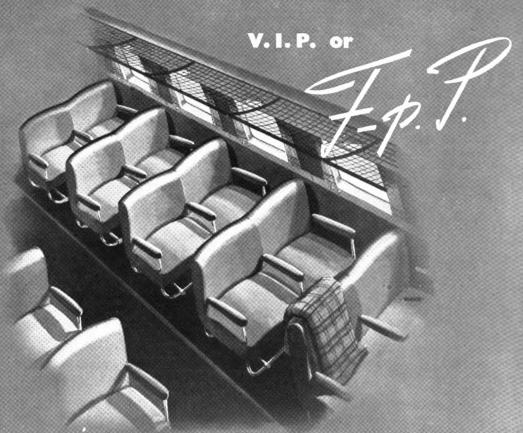
operating in this, "in due course take their place among the free and peaceful peoples of the world." The treatment of Germany during the Initial Control Period is to be governed by

the following principles:

- (a) Political Principles.—The Allied Control Council in Berlin will continue to exercise the supreme authority over Germany. The population of Germany is to be treated uniformly in all zones of occupation. The German nation is to be completely disarmed and demilitarized and all its war industries are to be eliminated or controlled by the Allies. The German people are to be convinced that they have suffered a total military defeat and that they are themselves responsible for their present state. The German National Socialist Party is to be completely and finally destroyed and its influence eradicated. German education is to be so controlled as to eliminate Nazi and militarist doctrines and to make possible the successful development of democratic ideas. The judicial system is to be reorganized in accordance with the principles of democracy, justice, "the rule of law" and equal rights for all. German political life is eventually to be reconstituted on a democratic basis. War criminals are to be brought to justice and Nazi officials are to be interned. There is to be no Central German Government for some time, nor will the country be divided into separate States (as has been unofficially suggested), but Local Government is to be gradually established on democratic principles under the supervision of the Allied Control Council. The freedom of the Press, of speech and of religion will be established, subject to the needs of military security. Trades Unions will be permitted and democratic political parties with rights of assembly are to be encouraged.
 - (b) Economic Principles.—The production of

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all armaments, aircraft and sea-going ships is to be prevented. Cartels, trusts, syndicates and other monopolies are to be abolished. Germany is to be treated as a single economic unit, and a balanced economy is to be organized so as to reduce the need for imports. The development of agriculture and of peaceful domestic industries is to be given priority. The Allies will control the German economy as much as may be necessary, but German administrative machinery will be used as far as possible, and the Germans themselves will be made responsible for the smooth and efficient carrying out of the economic plans prescribed by the Allied Control Council.

- 3. REPARATIONS. Reparations are to be exacted by the Allies in kind and not in money, by the "removal" of capital goods (mostly plant, machinery and raw materials) and by the seizure of Germany's external assets. The claims of the U.S.S.R. will be met by removals from the Soviet zone of occupation and from Germany's assets in Finland, Bulgaria, Rumania, Hungary and Eastern Austria; those of the other Allies by removals from the western zones of occupation and from Germany's assets in countries not already mentioned in this sentence. The U.S.S.R. will also receive some plant and machinery from the western zones. Poland's share will come out of that of the U.S.S.R. The material available for reparations is to be the surplus of Germany's productive capacity after allowing for the provision for the German people of goods and services sufficient to maintain among them average standards of living not exceeding the average standards of living of European countries (excluding the U.K. and the U.S.S.R.).
- 4. TERRITORIES AND FRONTIERS. No final decisions were taken as to the disposal of German border territories. These questions are to be settled later when the peace settlements are prepared. But it was provisionally agreed that:
 (a) The U.S.S.R. should have Koenigsberg and the northern triangle of East Prussia, and (b) Poland should administer the rest of East Prussia, Danzig and the Corridor, and all German territory east of the Oder-Neisse line. The disposal of the former Italian territories outside Italy was left for decision when the peace treaty with Italy is prepared.
- 5. TRANSFER OF POPULATIONS. German populations in Czechoslovakia, Hungary and Poland are to be transferred to Germany, under the supervision of the Allied Control Council, in such a manner as not to upset the economic arrangements of Germany.
 - 6. AUSTRIA.—Decisions as to the extension

of the authority of the Austrian Provisional Government to the whole of Austria are postponed until after the entry of the British and American forces into the city of Vienna.

- 7. POLAND.—The three Allied Governments recognize the Polish Provisional Government of National Unity, on the understanding that free elections will be held as soon as is practicable and that the allied Press will be given facilities for reporting them freely.
- 8. Neutrals.—Neutral nations will be welcomed as members of the United Nations, but an exception is made in the case of Spain under its present (phalangist) Government.

Comments

There can be no doubt that the Potsdam Conference was a success. It decided the questions that called for immediate decision and decided them wisely, laying down the broad lines of policy and leaving expert and specialist bodies to apply policy to circumstances. The representatives of the three Allied Powers were clearly determined upon two things: to prevent Germany starting another war and to initiate the restoration of Europe on an equitable basis. In both these tasks they have given an excellent lead.

One of the most difficult proceedings will be the transfer of some five or six millions of Germans from Czechoslovakia, Hungary and Poland into Germany. By this means will be removed several of the most prolific sources of international friction that might at any time lead to war. The immediate future of Germany is well provided for, but her more distant future is left to be determined later on, presumably by the United Nations. And the policy of San Francisco is reflected in the selection of the five leading Powers whose Foreign Ministers are to draw up the peace settlements.

Upon several important questions the Potsdam Conference was silent. For instance, it made no pronouncement upon the future control of the Bosphorus and Dardanelles, upon Persia's request for the withdrawal of allied troops from her country, and upon France's desire for some sort of international control over the Rhineland and the Ruhr. Probably no agreement was reached on these points and it was wise not to prejudice future discussion by premature expressions of opinion.

One question, however, upon which the silence of the Conference is to be regretted is that of the feeding of Europe during the coming winter. This problem is of the greatest importance and urgency, and it will require the most expert and patient handling if Europe is

not to become a prey to famine and pestilence. While everyone agrees that Germany alone is to blame for producing the present circumstances, in which starvation and disease seem almost unavoidable, Germany in her present state can do nothing about it and the responsibility for keeping the peoples of Europe, both friends and enemies, alive and reasonably well devolves upon the Allies. Their resources in food and transport are limited, and even with the assistance of other countries, the problem of providing and delivering food in the proper proportions and at the right times and places is going to tax their ingenuity to the utmost. This is not a military problem. It is a problem of economics and humanity. Upon its satisfactory solution will largely depend the peaceful resettlement of Europe and the future prosperity of the whole Continent.

Other international problems most immediately pressing are those raised by the conquest of Japan and the restoration of territories now occupied by the Japanese. In Europe again many additional problems arise, e.g., the re-establishment of France as a Great Power and her relations with the United Kingdom and other States; the territorial limits and political future of Poland and her relations with Russia; the problem of Russia herself and her external policy; the perennial problems of the Balkans, that hotbed of international enmity and strife. Balkan problems caused our grandfathers and great-grandfathers many headaches. There was the famous "Eastern Question" which once more presents itself to-day in an old familiar form, the claim of Russia to have more control over the Bosphorus and Dardanelles. Italy, too, will require considerable attention, and the disposal of her former territories in North and East Africa. And her rivalry with Yugoslavia over the port of Trieste may require that port to be placed under international control; as also may the port of Tangier, now under Spanish control. The future government of Spain will also interest international diplomatists.

The recent excitement in Syria and The Lebanon reminds us that there are influences and currents in the Middle East that might break out into a conflagration unless wisely and sympathetically handled; the Arab World is still a focus of interest and the Jews in Palestine and elsewhere present many problems. Perhaps most important for the peace of the world, during the next few decades at least, are the relationships between the three Great Powers, the United Kingdom, the United States of America and the Union of Socialist-Soviet

Republics. (May we not take comfort from the fact that the idea of unity is explicit in the title of each of these and hope that it may be significant of a firm and lasting union of the three?) And, lastly, the United Nations Organization is about to begin its work of promoting and maintaining world security and international peace and economic co-operation. A special study of the United Nations Charter appears in this number of The ROYAL AIR FORCE OUARTERLY.

The Atom Bomb

On 6th August, 1945, the world was informed that the scientists of Britain and America had discovered how to use the atomic energy; that they had applied this discovery to the making of bombs whose explosive power is more than two thousand times as great as that of the most powerful bomb previously produced; and that the first of these bombs had already been dropped on the industrial and sea-port town of Hiroshima in Japan. Subsequent reports indicated that about one quarter of the town had been completely destroyed by this one small bomb alone; and the world stands aghast at the mighty forces that have suddenly been released for the use of man.

We are here concerned not with the technical details of this discovery nor with its commercial possibilities, but only with its potentialities as a weapon of war and as a preserver of the peace. The general opinion seems to be that it will "revolutionize war"—a familiar phrase. applied to nearly every new weapon. But will it? Would it not be more accurate to say that it will revolutionize the methods of waging war? For war is, was and always will be an attempt to impose by force the will of one nation upon another. What part will the atomic bomb and energy play in this age-old game? Clearly, if one of the belligerents has this discovery at his disposal and the means to use it. while his adversary has not, then the latter must be very quickly brought to surrender or extinction. But if both sides can use it, then war becomes inexpressibly horrible.

At the present time, the secret appears to be shared by two Powers only: the United Kingdom and the United States of America. So long as it is kept by them alone, there seems to be little danger of its being brought into general use now that Japan has been conquered. But will the secret be allowed to remain with its present holders? Will not the other three Great Powers (the U.S.S.R., China and France) want to share in it? They too are to be permanent members of the Security Council

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of the United Nations, and on those grounds may claim the right to know the secret and to make use of it. It is difficult to imagine how it could be withheld from them, particularly as it has commercial possibilities and will sooner or later become the common property of the world.

To prevent this dreadful weapon being used by irresponsible powers, a rigid supervision will have to be exercised, on behalf of the United Nations, upon all plants capable of producing atomic bombs and energy. Otherwise it would come into general use as a weapon of incalculable destructive power to the grave danger of most of the world's inhabitants.

It has, however, possibilities as a weapon of peace. It could under certain conditions be used to prevent war. And the conditions are that it should become a monopoly in the hands of those nations who are pledged, and anxious, to preserve the peace of the world upon the principles of the United Nations as expressed in their Charter. With this decisive weapon at the disposal of the Security Council, all five of the Great Powers concurring, what nation would dare to oppose them with its puny might and risk extinction for the sake of some petty claim which could be settled more advantageously to itself at the Council table?

A leading article "The Bomb" in *The Observer* on Sunday, 12th August, put the matter very logically and forcibly. The article concluded thus:

"A Security System, by which all Powers are equally bound, is logical and necessary. It must have an executive in constant session; it must have force to back the executive's decision; and it must back decisions overwhelmingly and instantaneously. The new invention makes the use of force infinitely easier than ever before. If the United Nations can effect a monopoly of its manufacture and transfer its use—may it never need to be used on this earth again!—to a United Nations Force, only called upon by the United Nations Executive, as the police-station calls up its men, then there is a weapon against which no criminal could stand.

"The new weapon has this particular merit for a Security System. It is so powerful that it could be used effectively by quite a small, specially instructed Arm. It cuts out the need for elaborate interweaving of complex national and varied forces with all their separate traditions, jealousies and suspicions. Thus it enormously simplifies the recruitment and organization of World Police.

"Of course the uncertainties are many. There may be means of imitating "A" (A-bomb) with secret, small-scale production. But at present

the conditions are in favour of its serving a Security System. Production is most complex and expensive, and therefore can be limited. Results are prodigious and therefore beyond answer. Attached to a machinery of law, this thing may, after all, justify the title of an early H. G. Wells's book upon this very theme, 'The World Set Free.'

"But first the statesmen of all nations must be as bold as public opinion would have them, and public opinion, we believe, would now have them very bold indeed. The alternatives are perfectly plain. First, an all-in-Security System with an Executive and Police Force in constant readiness and with "A" at hand. There would be no exceptions for the Big Few, and there would be an unceasing search for any I.A.C. (Illicit "A" Construction). That is the possible beginning, at long last, of man's war-free life on earth. The second possibility is easily defined. It is the end.

A wise decision has been taken by the Government in appointing an advisory committee to assist it "in dealing with the many farreaching questions raised by the discovery of atomic energy, both as regards international treatment and to further development in this country, whether for industrial or military purposes. One of the ultimate effects on the national and international security measures which this discovery is most likely to have in future is to enhance the importance of military preparedness, and the greater necessity for mobility in all our security plans. The rapid over-running of the enemy's "key" points will surely call for substantial air and military forces, the latter being organized and trained as an airborne force. To assume that the atomic bomb sounds the death-knell of military forces generally is both dangerous and thoughtless. We invite a full and frank discussion of the potentialities of this new weapon, and of its effect on international security and the best methods of combating it.

Imperial Cable and Wireless Communications

A proposal is now under consideration for the reorganization of the cable and wireless communications of the Empire. These are at present owned and controlled, in the Imperial interest, by a holding company known as Cable and Wireless Limited, which was formed in 1929, on the recommendation of an Empire Conference in 1928, mainly for strategic reasons.

The object of amalgamating these interests under one owning and controlling body was to

prevent the cables falling into disuse on account of the greater speed and cheapness of beam radio communication. It was recognized that, while wireless communication is generally more useful in peace-time, it has disadvantages in war from which cables do not suffer. For instance, wireless transmission is unreliable to the extent that fading occurs at certain times and seasons and messages sent by wireless can easily be intercepted by an enemy; whereas cables can be relied upon almost always and offer almost perfect secrecy.

Now, it appears, this dual system, so efficiently controlled by one authority, may be split up into sections which would be separately owned and controlled by public utility corporations in the United Kingdom, in each of the Dominions and in India, "with the necessary

linking arrangements."

We do not know what these linking arrangements may be, but they will have to be almost superhumanly efficient if they are to ensure that the telegraphic and telephonic communications of the Empire, essential in peace and vital in war, are to be maintained as efficiently under half a dozen different authorities as they have been, since 1929, under one authority.

The British Army of the Future

We understand that the Army Council has appointed a Committee to consider the military needs of the United Kingdom after the end of the present war. Among the many difficult questions to which it may have to find or suggest answers, the following will rank high: what should be the strength and composition of Great Britain's standing army after the war;

should it be recruited on a voluntary or compulsory basis; and will it be possible to train the higher formations in this country, bearing in mind the great range and speed of modern mechanized forces which, even in the wide open spaces of Aldershot, Catterick and Salisbury Plain, very soon "run off the map."

The first question will be affected by the Nation's obligation, as a signatory of the United Nations Charter, to hold certain armed forces at the disposal of the Security Council for international enforcement action. Concerning the last question, it has been seriously suggested that North Africa offers a training area particularly suitable for large mixed forces of all arms, where tactical exercises could be made far more realistic than at home, where there would be no need to place the most delectable tactical positions "out of bounds," and where little compensation for damage would have to be paid because there would be little to no damage.

The Royal Air Force has long been accustomed to the idea of training both pilots and formations in Canada and the Middle East, and the Royal Navy has long had its training cruises in the various oceans of the world. So that to send armies overseas for training would not appear to be altogether an innovation. This would also facilitate the combined training of troops from the Mother Country and the Dominions, if such a scheme commends itself to those whose duty it will be to organize Imperial Defence and the contributions of the different parts of the British Commonwealth to the support of the United Nations. Transporting these forces will be mainly conducted by air and therefore greatly simplified and speedily effected.

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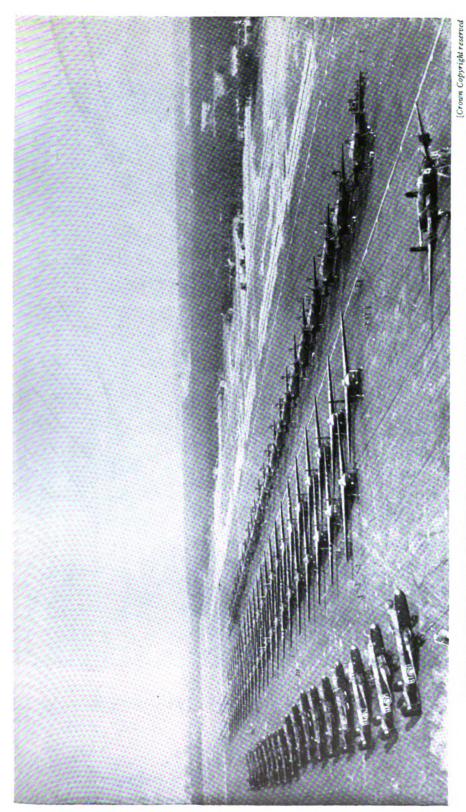


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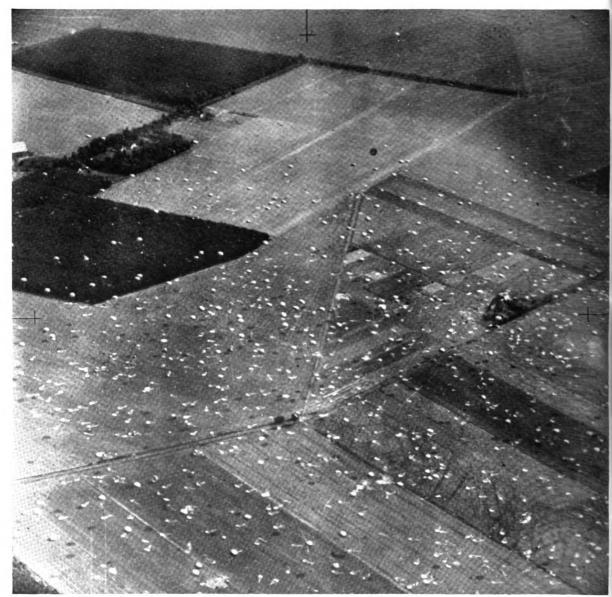
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AIRBORNE OPERATIONS—THE LANDINGS AT ARNHEM

FOREWORD

By Air Marshal Sir' Leslie N. Hollinghurst, K.B.E., C.B., D.F.C.

I am grateful to the Editor of THE ROYAL AIR FORCE QUARTERLY for the opportunity to write a Foreword to this thought-provoking article on the development of airborne forces. Little seems more certain than that airborne (and with airborne, air transportable) forces will play an increasing part in the wars of the future. The need to study the employment of these forces, therefore, needs no emphasis. The author has done the military student a service by giving him a conspectus of the subject which will serve as a basis for more detailed analysis.

But with airborne warfare (as with most new methods) there is the danger that its potentialities may be overstated—the attraction of the "third flank" is indeed great. I should, therefore, like to underline the author's conclusion that local air superiority is essential for the successful launching of an airborne operation and during the subsequent support phase. The allocation of air resources to exploit that air superiority must, therefore, be kept in phase with the means of obtaining it. If our resources are unwisely allocated; if they are insufficiently flexible, then we may never be able to bring about the air situation required for the effective use of one of the most potent weapons in the Empire's armoury.

There is, of course, no "Black Magic" about airborne operations. The old principles still apply. The highest standard of training and of staff work is still essential; there are no short cuts. Above all, the necessity for comradeship, sympathy and understanding between the two arms at all levels and at all stages is paramount—perhaps it was the achievement of this which helped so much to make the airborne operations in North-Western Europe during 1944 so successful.

It is, possibly, not inappropriate to conclude this Foreword by paying a tribute to the many gallant officers who did so much to develop the air side of airborne operations and who are no longer with us. Amongst them it is, perhaps, not invidious to mention Nigel Norman, Peter May, Peter Davis and, more recently, Scarlett-Streatfeild. Their names will live long in the history of Airborne.

Five Years of Airborne Development

IN October, 1945, it will be five years since the first parachute unit was formed in this country. Commando volunteers were trained and converted at the Central Landing Establishment opened in June, 1940, at Ringway, near Manchester. There was born the tiny infant which later grew into the giant of Arnhem and the Rhine crossing.

What have we learned in the five years of airborne battle and preparation for battle? What place have these new forces attained in the modern army? What trends have been re-

vealed in their development?

The answers to all these questions take us back to three years before the war—to 1936, when the Russians gave a demonstration of military parachuting. It was a year when the democratic world was still bent on peace. The only power to realize the full significance of that lesson was Germany. The Russians themselves did not develop it, and still have not used it to any extent in actual warfare.

Germany reacted quickly—so quickly, in fact, that it is probable she was engaged in simultaneous experiments which were only allowed to be revealed after the Russians had first shown their hand. At any rate the first German Parachute Regiment was formed that same year, towards the end of 1936. In addition German experts were working on designs for a paratroop and troop-carrying glider. By 1939 the one Parachute Rifle Regiment had been expanded to an Air Division, with its own transport aircraft and with gliders capable of carrying ten men with their weapons.

When war broke out, therefore, Germany had stolen a march on every other Power in capacity for airborne warfare. She had designed and tested a suitable parachute, and she also had, ready for use, a troop-carrying glider. But she had no intention of reaveling the full extent of her new weapon until the time was ripe. In Poland, in 1939, parachute troops were used, but more to complete their training in actual war-time conditions than as an integral part of the invading force. It is believed that they accomplished little, and that little was kept a close secret.

It is evident, however, that the tests under fire in Poland had fully satisfied the German High Command. Airborne troops played a bigger role in Norway. Carried in Ju. 52's, they easily secured the airfields at Oslo, Stavanger, and Trondheim. Once more their successes were screened from the outside world, although British and Norwegian troops were able to disclose enough to cause grave concern in this country,

FIRST REAL TRY-OUT

It was in May, 1940, that the Nazis played their carefully concealed trump card. Airborne forces were used on a scale never before known and it was due largely to them that the Dutch were overcome with such tragic speed. In the main, the object was to seize the aerodrome near Rotterdam, fly in airborne troops to hold it, and then strike against the defenders' rear. The plan worked to perfection. Between ten and twelve thousand troops, it is estimated, were successfully landed.

For the operation the Germans used an infantry division reduced to under 7,000 in number, and trained for the airborne role. Apparently only about 300 aircraft were mustered, but, skilfully used on a shuttle system, the effect was equal to 600 aircraft in three waves on the first day, and 250 aircraft in two waves on the second day. Losses both among the parachutists and the airborne infantry were heavy, but were

amply justified by the results.

No gliders were used in the Rotterdam operation. They were kept for reinforcing the parachutists' assault on the Belgian forts along the Albert Canal. The capture of Fort Eben Emael, strong, modern, and believed to be almost impregnable, was the most striking success. It was achieved by parachutists landing in places above the elevation of the fort's guns. Aided by engineers with flame-throwing equipment and explosives landed by gliders, they were able to blast and burn out the defenders from above. Much nonsense was talked about Fort Eben Émael. Undoubtedly it could have been reduced by more orthodox methods. But there can be no doubt that the use of paratroops saved the Germans a long and costly land assault.

Simultaneously with these two major operations, other parachutists were scattered all over Holland to divert the Dutch troops from other defence work. These, too, were very largely successful.

The invasion of Holland is an old story now, but it has been recalled in some detail because of two very important factors which resulted: first, it sounded the final alarm which galvanized Britain into action, and, secondly, it pro-

vided a model of German airborne warfare procedure from which they afterwards never greatly varied.

LESSONS OF CRETE

The Germans had given the demonstration; but Britain was quick to learn the lesson and show that the pupil could improve on the teacher. The Central Landing Establishment, later to be more properly called the Parachute Training School, was set up. There was a shortage of aircraft, shortage of equipment, and shortage- of experience, but much valuable ground work was accomplished.

The first operation ever undertaken by British airborne elements apart from isolated drops in enemy territory for secret purposes—was in Southern Italy in February, 1941. It was on a very small scale, involving not much more than a company, and it was intended to blow up an aqueduct near the Sele River in the vicinity of Naples. It was not completely successful, but it afforded valuable experience.

We still had many lessons to learn, and one of the most important was taught us by the Germans when, in May, 1941, they attacked the island of Crete. They used airborne forces on a scale never before known, and, it must be admitted, on a scale not conceived by us. Altogether some 32,000 troops were transported by air, chiefly in gliders towed by Ju. 52's, as in Belgium. Fighters were provided to afford cover to the gliders and towing aircraft, but, in view of the small air opposition proved, in the event, to be hardly necessary.

Public opinion was so impressed by the capture of Crete that it has not always realized how far from a clear-cut victory it actually proved to be. The Germans made two bad mistakes. They dropped their troops on the best-defended points, and they did not always drop them within reach of their equipment. The idea of the drop was to smother the strong-points first, but in fact the result was to ensure that the parachutes and gliders were within range of the most concentrated fire at the worst possible time, that is, when preparing to reach the ground. Many were killed or wounded in the air, and still more whilst trying to reach their equipment on the ground.

Despite these losses, Crete fell, and its fall was largely due to another new development in airborne warfare, the dropping of heavy weapons, including mountain guns, by parachute. There were, then, four lessons for us as a result of Crete:

(a) Paratroopers should be dropped around, and not on, their target;

- (b) A better method of dropping equipment near them must be found;
- (c) Heavy equipment could be dropped; and(d) Strongly-held bases could be captured by air alone.

This last point was emphasized by the capture of the Isthmus of Corinth, which fell to parachutists alone.

The success of the Germans on Crete convinced those who had still doubted the value of airborne troops. Expansion in this country proceeded rapidly, and the provision of equipment improved. By September, 1941, the First Parachute Brigade was in being, followed soon afterwards by an Air/Landing Brigade. It was true we were still not much in advance of the position the Germans occupied at the beginning of the war, but we had the inestimable advantage of being able to profit by all the mistakes that had been made by ourselves or by the enemy. That we had in fact profited was soon proved by the success of the Bruneval episode.

BRUNEVAL AND THE FIRST BIG OPERATION

The raid on this radiolocation station on the French coast was a complete success. Of the force dropped only one man sprained an ankle, and that did not prevent him from fighting and getting away again. The number dropped comprised a company, and their mission was to seize the radiolocation station equipment and bring it back for examination in England. They secured the vital apparatus and brought it back with a minimum of casualties.

In November, 1942, the invasion of North Africa saw the first large operation by British airborne forces. That operation can be said to mark the turning-point in the airborne war. Until then we had only developed from the stage of not possessing an airborne weapon at all to the stage of having forged one and of having learned its use. From now on we were to test our steel in earnest.

A parachute brigade of the 1st Airborne Division took part in the African operation. The objectives were to capture the Bone and Oudna airfields, and to assist the French in ousting the Germans from Souk el Arba. The landing was made from United States aircraft piloted by Americans.

On 12th November, 1942, one battalion dropped at Bone and secured the airfield without opposition. The battalion which dropped, again in daylight, to attack Oudna airfield captured its objective and threatened the southern approaches to Tunis. Their success was negatived, however, because no contact was made with British armour as intended, and the bat-

talion had to withdraw through enemy-occupied country. The third battalion, which had dropped at Souk El Arba, advanced to Medjes El Bab and assisted the French, but when German resistance stiffened they were withdrawn to a good defensive position. By the end of the month of November the airborne role of the Brigade had been completed and they were then used in the line as ordinary infantry.

From now on the lessons learned were rather different. Up to the time of Crete we were concerned with grasping the broad principles of airborne warfare: now it was necessary to learn the finer points, points which could make or mar a whole operation. We had the right weapon, but we had to learn how best to use it. From this aspect, one of the most important points which emerged from the African venture was the necessity for more detailed briefing; for maps, photos and models of the actual area.

Another factor which was emphasized was the need for training the airborne troops with the aircrews actually detailed to carry out the dropping. Mutual confidence was found to be important. Finally, we now recognized the value of more liaison: of an R.A.F. staff actually stationed with the Army H.Q. to advise on airborne matters.

Meanwhile the total of our airborne forces was quickly growing. While the 1st Airborne Division were winning their spurs in North Africa, the 6th Division was forming in the United Kingdom.

Eventually a Corps Headquarters was formed, with both Airborne Divisions as well as specialized airborne units under its command. At the same time both the Middle East and the Far East Army commands were raising their own formations.

British Gliders in Action

Sicily was the next testing ground. This was the largest Allied airborne operation which had yet taken place. A whole British airborne division was engaged (as well as an American division), and British gliders were used for the first time. In some respects the experience of Sicily also provided the most valuable lessons. Difficulties which it was thought had been overcome were found to have been under-estimated but at the same time we were able to correct some of our biggest mistakes in earlier drops.

As far as the British division was concerned, the intention was to seize bridges, cross-roads, and other important communication points. The task of the First Air Landing Brigade was to seize and hold the crossing over the waterways at Ponte Grande and to operate against

the town of Syracuse. The First Parachute Brigade was to capture the river crossing at Ponte di Primosole. All the objectives were attained, but at a high cost, owing to the fact that a large proportion of the air Landing Brigade came down in the sea. The chief reason for this was the poor visibility and bad weather, coupled with a number of mistakes in selecting the release point for the gliders.

As a result, it was decided to give aircrews more experience in parachute dropping and glider-towing, both by day and by night, and if possible more experience in operating under actual war conditions, in order to ensure that they continued on to the correct landing or dropping zone despite diversions due to flak. To assist the air crews in finding the zones, it was realized that they must be marked more clearly with lights and smoke and also with radio aids if available.

It was also found that container-dropping was often unsatisfactory, chiefly because the supplies too often landed in places not immediately accessible to the airborne troops. The Germans had experienced this difficulty in Crete. Better methods of release to ensure that the containers fell nearer the men without endangering them, had to be found, as well as some means of marking more prominently the spot where they fell.

This problem was actually not fully overcome until some time later. Various devices, such as signal lights on the containers, were tried, but it was not until the adoption of the method of dropping the equipment with the parachutist that the problem was really solved. The aim now is to pack as much as possible into a kitbag actually attached to the airborne soldier, so that he is able to fight as soon as he lands. He then has a much better chance of reaching any extra equipment dropped in containers than he would have if he is virtually unarmed until he finds his weapons.

One other development followed the experience of Sicily—it was realized, as the experience in North Africa had foreshadowed, that the airborne troops could not be regarded as distinct from the infantry. Glider pilots, once they reached the ground, could not be withdrawn immediately. They became, *ipso facto*, part of the fighting force, and they had to be taught to fight on the ground.

British airborne forces had by this time (the autumn of 1943) almost reached the striking capacity they needed for the invasion of Europe. But there was still one surprise shot in the Nazi locker, and it was directed against the Greek island of Leros in November, 1943. The

feature of this attack, which we did not fail to note and later use in the attack on Normandy, was the heavy and continuous bombardment of our positions, followed by the arrival of the transport aircraft almost immediately the boming had ceased. Only a battalion, numbering 500 men, was dropped, but it played a decisive part in the battle and succeeded in cutting the neck of the island and splitting the defence. With their local superiority in the air, the Germans were able to reinforce the parachute battalion by sea and to thrust in bridgeheads of seaborne troops. Within four days the island was conquered.

DETAILED PREPARATION

The most interesting feature of the Leros attack, so far as any reaction on our airborne development was concerned, was that it confirmed the comparative lack of progress in this form of warfare made by the Germans. They were still using the strategy of 1940—to seize a vital point near the area of their main attack, to divert the defenders, and to attack from the rear if possible. The Leros attack was successful because the terrain suited this type of attack, but it showed an encouraging lack of adaptability. To those "in the know," it was clear that in airborne strategy we had now advanced beyond the Germans. We lost Leros, but we gained confidence.

Seven months later, with the coming of D Day, the airborne army proved that that confidence was not misplaced. From early in 1943 the 6th Airborne Division had been training, and by June, 1944, they were ready for the big operation. Every important lesson of the previous four years had been remembered. Everyone, down to the lowest rank, knew by heart the exact locality in which he was to land. They had seen photographs and models both of the landing zone and the surrounding country. They knew the R.A.F. crews and had trained with them. Arrangements had been made for the clear indicating of DZs. and LZs. Heavy equipment, including tanks and 16-pdr. and 17-pdr. anti-tank guns, was to be carried.

At 0020 hours on D day, 6th June, 1944, various sections of a specialist parachute company landed on their allotted DZ/LZs. to mark them for the arrival of the main bodies later. The main body duly arrived at 0100 hours, but owing to bad weather and poor visibility dropped their paratroops or released their gliders over a wide area, as well as in the selected zones. This delayed the concentration of the airborne forces but had the unexpected

and very valuable result of confusing the Germans for some time as to where the main attack was to be launched!

The Air/Landing Brigade did not fly in till 2100 hours on D Day, using Horsa and Hamilcar gliders and carrying the heavier equipment, such as tanks and guns.

The object of the 6th Airborne Division was to guard the left flank of the Allied Armies, which was bounded by the Orne river and canal. All the bridges were seized intact. In addition, parties of airborne troops were crashlanded right on to their objectives, such as the coastal gun battery at Merville, and these also very largely succeeded in their tasks.

Normandy was a complete justification of our airborne policy. We had proved that, correctly handled, our troops could seize objectives against which a direct attack would have been prohibitive in cost of men and material. We had proved that intense training had produced glider pilots capable of landing with great accuracy. The Hamilcar had successfully passed its first big test.

IMPROVEMENT AND ADJUSTMENT

But we had also found several other features which needed improvement and adjustment. It was undesirable, for example, to assign to one airborne unit a task vital to the whole operation. In apt phraseology there should be several arrows to every bow. Again, individual navigation by aircrews, if properly trained and briefed, was more productive than the followmy-leader system, where one mistake by the leader could nullify the efforts of a whole force. Deficiencies in the armament of the airborne divisions were found. They needed more antiaircraft armament, more counter-mortar firepower, and an air support unit. All these lessons were duly learned and later brought into effect.

Reviewing airborne operations up to D Day, it is interesting and instructive to tabulate the lessons learned both before and after the event. Such a table would look like this:

The Lesson The Place Airborne forces vital to the modern \Holland, 1940. army. must avoid strong-Paratroops points whilst landing. Crete, 1941. Heavy weapons successfully landed by air. Airborne briefing must be more detailed. Aircrews and troops must be N. Africa, 1942. trained together. Closer liaison between R.A.F. and Army.

The Lesson. The Place.

More accurate drops needed.

Zones must be better marked.

Container-dropping sometimes unsatisfactory.

Individual rather than follow-my-leader navigation.

More fire-power and more air support.

Key tasks should be duplicated.

GALLANT ATTEMPT

Armed with this new knowledge we attempted in September, 1944, the largest operation yet undertaken by Allied or enemy airborne forces—the attempted break-through at Arnhem.

Two American divisions and one British airborne division, together with one Polish Brigade, were involved. The American operation was a complete success, but the British objectives, though pressed home with great gallantry, were not achieved. The story of Arnhem cannot be told better than in the words of a report prepared by the appropriate section of the War Office airborne department, to whom the writer of this article is indebted for much of the material used:

"These notes only deal with the British part

in the operations.

"The object of this operation was to seize the bridges over the three main rivers barring the way of the British Second Army from the Belgian frontier to the north-west plain of Germany, at Arnhem.

"First Airborne Division with supporting troops had the task of seizing the bridges at Arnhem and establishing a bridgehead around them. This entailed dropping troops approximately sixty miles in advance of the nearest Allied ground forces, which was the furthermost distance yet attempted. As it turned out, this plan was too ambitious, but if it had succeeded it might have had a profound effect on the course of the war.

"This operation, being on such a large scale, strained the resources of transport aircraft. As a consequence, the First Airborne Division was carried in three lifts in daylight.... On the 17th September the landings were all accomplished very successfully with little or no opposition and practically 100 per cent. were on the correct DZs. and LZs.... The second lift, consisting of a second parachute brigade and the remainder of the Air/Landing Brigade were successfully flown in. The third lift was twice postponed and did not take place until 21st September. Visibility was extremely poor, and as a result several aircraft returned ... without dropping their loads."

Attempts to re-supply the troops landed were only partially successful, chiefly owing to heavy enemy flak. This was one of the most valuable lessons learned at Arnhem—the fact that close air support must be available to protect supply aircraft from enemy ground action.

The other big factor emerging was that to be fully effective at once, an airborne division must be put down in one lift. Otherwise a good proportion of the strength for immediate opera-

tions is lost.

Between the operations at Arnhem and the Rhine, when British airborne forces achieved their crowning success, the Germans made a last attempt to turn the tide of war with the assistance of her airborne arm. In December, 1944, the Nazis launched the offensive in the Ardennes.

About a thousand parachutists were dropped by night—the first German attempt at a night operation, and a particularly unsuccessful one. Only 300 of the 1,000 ever reached their objectives. They were handicapped by ignorance of the Allied positions due to lack of aerial reconnaissance.

THE FINAL TRIUMPH

Last March the Allies launched the latest airborne operation as part of the crossing of the Rhine. This time we did not make the mistake of leaving too long a gap between the ground forces and the airborne troops. This time, too, the link-up took place in a few hours, making it the most concentrated airborne attack in the history of warfare. Two airborne divisions were landed in one lift over a period of about three hours, using some 1,500 aircraft and 1,300 gliders. Instead of the assault taking place before the main crossing by ground troops, surprise was achieved by not attacking from the air until several hours afterwards.

The lessons of Arnhem had been well learned. Immense cover was given by the Tactical Air Force. Flak positions were effectively neutralized so that they could not interfere with airborne operations. In addition, enemy airfields in the area were put out of action.

Reviewing all these airborne operations since the modest beginning in Italy in February, 1941, two principal trends become apparent:

- The carrying by air of increasingly heavy equipment.
- 2. The extension of airborne warfare from daylight to darkness.*

^{*} It must be noted, however, that this trend was finally reversed. Sicily and the first part of 'D' Day and Arnhem were carried out in the dark. The second part of 'D' Day and Arnhem were carried out by day.—ED.



The first trend needs little emphasis. From the beginnings, when only light guns were thought sufficient, we now have the Horsa carrying a 6-pdr. gun and a jeep, with crews for both. The Hamilcar carries the 7½-ton tank with crew. There seems no logical reason why, in the course of time, the problems of lifting and successfully landing even heavier weapons may not be overcome.

The second tendency is one of the major reasons for our superiority over the Germans. They had only one experience of night operation, and that was conspicuously unsuccessful.

There were other reasons for our superiority. Our parachutes were better than the ones used by the Germans; the latter had, for example, no quick-release device equalling our own. Naturally, many factors affecting a comparison cannot be mentioned, but it can be said that our scientific devices for enabling aircraft to locate the correct LZs. and DZs. were far more accurate than the enemy's.

JAPANESE ATTEMPTS

So much for the airborne operations of Britain and Germany. No mention has been made of the successes of the Americans, which are a separate study in themselves. But something may be said of the other warring Powers.

Russia, after taking the lead in the initial stages, turned her attention to achieving superiority in the more orthodox ground warfare. Lack of air superiority in the early days of the war may have influenced this decision. Italy, apart from a few unimportant experiments, took no part in airborne warfare.

Up to the time of writing, Japan's activities in this direction have actually exceeded ours in the Far East, since the air part in the battles of Burma have called for supply and evacuation by air rather than actual paratroop operations. The transfer of large forces has, of course, been undertaken by air in Burma and other theatres, but these forces have been chiefly infantry transported in aircraft for the sake of convenience, not because they had been specially trained for the air role. Very valuable experience has been gained in re-supply by air, but this again has been a convenient substitute for road convoys rather than paratroop or air/landing operations.

Japan, on the other hand, has attempted to carry out airborne warfare somewhat on the German lines. Parachute training in Japan commenced not long after ours, towards the end of 1940, when a number of Nazi instructors arrived. Apparently these instructors did their work well, for the paratroopers available at the

time of Pearl Harbour were well chosen, well trained, and available in sufficient numbers to be a force to be reckoned with.

The first Japanese airborne landings were made in February, 1942, at Palembang. Some seventy aircraft, with about ten times that number of men, were used, and casualties were heavy.

As was the case both with Britain and Germany, several mistakes were made in the initial stages. There was some bombing before the drops, but no low-level strafing to neutralize the anti-aircraft fire from the ground. The drops were comparatively well-aimed, but the men were released at too great a height, and the proportion of losses while the parachutists were at the mercy of the ground defences, was comparable with that of the Germans in Crete. The net result was that one unit missed its objective—an oil refinery—altogether, and was wiped out. The other two units were successful, but sustained heavy losses.

The next operation was on Timor, and it showed that the Japanese had been quick to learn the lessons of their previous experience. This time there was ground strafing in order to soften up the opposition, and the drops were made at a much lower height. A further point was that the aiming was a good deal improved. Despite the heroic defence, the enemy's objectives were attained, and the Timor operation can be said to have been a definite Japanese success.

A later operation, the landings on Leyte in November, 1944, was the least successful. It is still too recent for details of the lessons learned to be given, but it can be stated that Leyte confirmed the fact that we had little to learn from the Japanese unless they had something much better than Leyte in their programme. The metaphor is apt, for one of the tricks used on Leyte was playing of musical instruments as a method of signalling.

In one respect only can the Japanese be said to have enjoyed a certain measure of superiority in the past—in the disruptive effect of parachutists scattered over a wide area behind the defence. The suicide tactics of the individual Jap give him a particular nuisance value in this kind of attack.

Two of the three questions postulated at the beginning of this article have now been answered. We have examined the lessons learned since the start of airborne warfare, and we have studied the present trends. One question remains, the position which the record of operations over the past five years entitles

airborne forces to occupy in the general picture

of Allied strategy.

Popular views on the part to be played by airborne forces in war have changed considerably from time to time. Airborne stock mounted fairly steadily until the invasion of Crete, which led to a number of hastily conceived suggestions that the days of ground forces were numbered, and that eventually the Navy and the R.A.F. would be able to transport all the armed forces needed for a successful battle. Since then a sense of proportion has been restored, and the experience at Arnhem, particularly, has sounded a timely warning for the benefit of those whose ideas were too ambitious.

CONCLUSIONS

The truth is that although we have brilliantly overtaken the start gained by other nations at the beginning of the war, and although we have been receptive in our ideas, the use of parachute and glider-borne troops is even now so recent as to be still in the experimental stage. Development has been so rapid, and potential developments are still so varied, that it would be idle to set an arbitrary limit on the possibilities.

It is more profitable to recount what we have so far established to be the cardinal principles for success

Chief among these is that the attacking army must have *local* air superiority. General air superiority can be disregarded, as the experience at Leros showed. Next, the number of tugs and gliders must be enough to transport the whole force as far as possible in one lift. The partial failure at Arnhem and the success over the Rhine demonstrate this.

But the one vital factor is weather. No matter how ingenious the devices to attract the aircraft to the correct zone, if the weather is bad and visibility poor, men and supplies are bound to go astray. And finally the most important principle of all—the airborne arm must not be expected to do too much. They must be dropped and landed in zones within reasonable reach of the attacking ground troops. Tunis and Arnhem were the operations which established this limit of prudence.

There are, of course, many other factors which must be taken into account if an operation is to succeed, but these four may be considered the most important. And of these the most unpredictable is the weather. Within human limits, it is possible to ensure air superiority and sufficiency of aircraft. It is possible to plan an attack so that link-up with the ground forces is not long delayed. But it is not always possible to plan an attack so that linkup with the ground forces is not long delayed. But it is not always possible to know in advance what sort of weather will prevail throughout the attack, particularly if it lasts several days. Therein lies the real Achilles' heel of the airborne soldier in his present stage of development. Compared with the ground fighting man, he is in the same relation as the aeroplane to the tank. Sooner or later, with the development of scientific devices, this handicap will be overcome, but at present it must be taken into serious account.

North Pole

The only sign of life seen from the Lancaster Aries on its flight over the Magnetic Pole was an unidentified bird flying at 14,000 feet.

The world's cold belfry: drifting seas of wrack:

And through the cloud vents, cloughs of ice and snow. . .

Here the sun rounds unsleeping, like a clock.

Here is virginity and desolation. Not chaos, but the trance of land secured By its conditions from the corsair nation.

Not total desolation, by the one Traveller winging to the unknown goal, Alone between the ice packs and the sun.

Broadcast by B.B.C. on 18th July.

What roundel did he bear, that single flyer, Through the unpeopled realm he was monarch of,

On wild thin-blooded wings past food or fire?

Did he learn heartbreak on the arctic gales, Or was he, a stranger, wheedled from his course

To the encounter where the compass fails?

Or was he but a protest in man's eye— The blind subjective Icarus conceived Against intolerable vacancy?

WRENNE JARMAN.



Fighter Command

N the afternoon of 16th October, 1939, hundreds of people in Scottish towns and villages in Fife and the Lothians watched pilots of two Scottish fighter squadrons go into action against the Luftwaffe for the first time over Britain. Three of a force of a dozen German bombers which flew in to attack shipping in the Firth of Forth were shot down and the first victories were recorded for the R.A.F. Fighter Command.

From that October afternoon six years ago to the end of the European War, Fighter Command, in defensive and offensive fighting, carried its tally of enemy aircraft destroyed to

over 6,500.

Fighter Command's first major task of the war was to help provide cover for the B.E.F. during the evacuation from Dunkirk in May-June, 1940. For a full fortnight fighter squadrons carried the whole burden of protecting the men on the beaches from air attack and their tally of German bombers and fighters destroyed was well over the 400 mark.

Then, after a few weeks' breathing space, came the Battle of Britain, in which the fate of Britain and the Allies was decided over the English Channel and South-East England. Countering first the heavy attacks on our convoys in the Channel, fighting next in defence of their own bases and finally over the rooftops of London, the "Few" shot down 2,375 German raiders for the loss of 375 of our own men. Highlight of the Battle was 15th September, when 185 of the enemy were destroyed.

While for the first half of 1941 night-fighter squadrons fought the menace of the German night bomber over Britain, day squadrons opened Fighter Command's offensive programme with a series of fighter sweeps, escorts to medium bombers and low-level attacks on ground targets in occupied France, Holland and Belgium. By June a great offensive was well under way and during a ten-week peak period our fighters shot down 500 of the enemy.

It was in this year, too, that the Air/Sea Rescue Service came into being under the operational control of Fighter Command. Operating first with high-speed launches and Lysander spotting aircraft, and later with Spitfires and Walrus amphibians, the Service was responsible for saving the lives of thousands of R.A.F. and Allied aircrew members.

The following year (1942) saw the daylight offensive stepped up, and great developments made in night intruder operations begun after the Battle of Britain.

"Baedeker" raids on British cathedral cities as "reprisals" for the R.A.F. 1,000-bomber raid on Cologne started in June. Our night fighters and intruders met the challange and inflicted heavy losses both over Britain and over Luftwaffe bases on the Continent.

The 19th of August, 1942, brought the Battle of Dieppe, the great rehearsal for invasion, and another big air victory for Fighter Com-

mand.

Although only ninety-one enemy aircraft were claimed as destroyed, it is probable that nearly 200 enemy aircraft were knocked out by our squadrons during the day.

In December, 1942, and during the following three months, the Luftwaffe staged daylight tip-and-run raids with bomb-carrying fighters on

the English South Coast.

From December to the end of March, 1943, of about 960 enemy aircraft which crossed the English coast our fighters destroyed a total of 121.

From April, full-scale offensives were the order of the day, our fighters going out with medium bombers and also escorting and providing diversions for American Fortresses. Generally, the enemy fought shy of battle and dog-fights decreased, although on these offensive operations some 400 German fighters were destroyed by Fighter Command squadrons in five months.

Fighter Command temporarily lost its name on 15th November, 1943, and did not resume its title until 15th October, 1944. In the interval however many of its pilots became the nucleus of the R.A.F. 2nd Tactical Air Force and did great work in the ultimate extinction of the Luftwaffe on the Continent.

Meanwhile, "Air Defence of Great Britain," by which name Fighter Command was known in pre-war years, made a reappearance to guard the base for the invasion of Normandy. A.D.G.B. also successfully fought the Battle of the Flying Bomb, fighter pilots alone destroying nearly 2,000 of these weapons.

From October, 1944, Fighter Command again defended the country against the very few enemy raiders which appeared, but its chief duty until the end of the war was to provide fighter escort for aircraft of R.A.F. Bomber Command on their missions deep into Germany and Austria, escorting R.A.F. Coastal Command aircraft on shipping strikes, night-intruder work and attacking with Spitfire bombers the V2 targets, communications and installations which the enemy set up in Holland.

Bomber Command

THE tactics of night bombing are different in almost every particular from those of day-bombing, though the strategy of both is essentially the same. It was just as essential to gain and exploit air superiority by night as by day, in order that German war industry should be crippled, German communications destroyed, and the way prepared for the Allied armies to land on the Continent and invade Germany. But no pitched battle was ever fought between the bomber force and the German defences; it was always a matter of single combat between bomber and fighter, with all the advantage, once the combat had begun, on the side of the fighter. For Bomber Command the main object of bomber tactics was therefore to gain air superiority by preventing the fighter from joining battle with the bomber; to outmanœuvre the German Air Force rather than to destroy its defensive aircraft outright in the air. It was inevitable that the enemy should end the war with a powerful night force still intact; he had maintained a front-line strength of some 800 night-fighters for a long time and the force was still there at the end of the war, though latterly it had been unable to operate with full effect because of lack of petrol. But this did not mean that the battle had not been completely won. On the contrary, the night-fighter force had persistently failed in its object and at the same time had been prevented from fulfilling any other function than defence against night bombing—and this had very grave consequences for the strategy of the German Air Force as a whole. That state of affairs was achieved by a constant use of the latest scientific devices, by the use of sound tactics and above all by the courage and skill of the bomber crews who were always ready to engage a faster, more manœuvrable and more powerfully armed fighter aircraft when the enemy did succeed in making contact.

At the beginning of the war, in 1939 and 1940, Germany had no night-fighter force. The defence of Germany, against a bomber force which the enemy knew to be weak, was entrusted to anti-aircraft guns and searchlights. This was reasonable on the hypothesis that Germany would expect to win the war outright long before the Allies in the West could build up any considerable bomber force. In the early summer of 1941, when the Battle of Britain had deprived Germany of the hope of final conquest in the West and the invasion of Russia was projected, some better defence had

to be organized against the increasing threat of bombing from bases in England. A force of some 250 Messerschmitt 110s was formed. As with almost all German night fighters, and all German twin-engined night-fighters, these were modified bombers, but at that time a rather unsuccessful type of bomber was chosen; later it became necessary to convert to night fighting more successful types of bomber, the Junkers 88 and the Dornier 217.

So began a course of action which profoundly modified the whole strategy of the G.A.F. At this time, in June, 1941, Germany had a force of 1,500 bombers, largely designed for cooperation with the German army, though used in the previous winter to bomb London and other British towns. Next year, in June of 1942, the enemy still had a force of 1,500 bombers. But by June, 1943, the enemy's twin-engined fighter force had risen to 530 and there was a corresponding decrease in bomber strength, which then stood at 1,300 aircraft.

By September of 1944 the enemy's strength in night fighters and bombers was roughly equal, about 800 of each. But in actual production of aircraft there had been a much greater shift than the figures would suggest from bomber production to night fighter production; the bomber strength remained at a high figure because the aircraft were seldom used in operations after 1942, and the front-line strength was maintained by a policy of conservation. It is a paradox of the war that the night bombing of Germany defeated the German bomber force even before the enemy's aircraft industries had been reduced by air attack.* The strategic importance of the German army's loss of all bomber support can hardly be exaggerated; the weapon which made the blitzkrieg possible, from 1939 to 1941, was struck from the enemy's hands. The enemy would have been fully justified in exchanging an offensive for a defensive weapon if this had in fact made the night bombing of Germany impossible. And at first it must have seemed to the enemy that he had a fair chance of succeeding in the policy of attrition against Bomber Command. In 1941 Bomber Command's casualty rate was 2.5 per cent. of all sorties; in 1942 it had risen to 4 per cent. and the night-fighter strength was due to be more than doubled by 1943. During 1943 the

^{*} To what extent, however, Germany's policy of relying more on V-1s and V-2s than on bombers contributed to this is a question. It now seems probable that this was a factor of some importance.—ED.

great expansion of Bomber Command's force was to occur, but if the night fighters could shoot down a larger percentage, and not a very much larger one, than in 1942, the result would be either that the expansion would never occur or that operations against German industry would have to be infrequently carried out. Two to three hundred four-engined bombers were being produced every month, and if forty bombers could be destroyed in each major operation, and if there were to be six major operations a month, any great access of strength would be unlikely. Such a result was by no means improbable; the Battle of the Ruhr, from March, 1943, onwards, was not fought without heavy casualties and the German night-fighter force was becoming not only stronger but more efficient.

From 1941 onwards a great number of stations had been built up throughout Germany to control the night fighters; the enemy had also an efficient early warning system. With experience, co-operation between the night fighters and these ground stations became more and more effective. The first answer to this system was to concentrate the bombers in time and space during their journey to and from the target; this difficult navigational feat became increasingly easy as navigational aids were developed. Such concentration meant that at any one time only one or two ground-control stations linked to a comparatively small number of fighters had the bomber stream within range. On the whole, increased concentration along the route balanced the increased efficiency of the German defensive system; the casualty rate in 1943 fell from 4 per cent. to 3.7 per cent.

But this rate is for the whole year. On the first night of the Battle of Hamburg, on the night of 24th/25th July, the casualty rate, for

instance, was 1.4 per cent.

After this battle the enemy's first reaction was to send the fighters to intercept the bombers over the target instead of to attack them whenever they were within range of the ground control stations. A single-engined night-fighter force, with a strength of about 350 aircraft, was also developed to intercept the bombers over the target; with the new system, aircraft of shorter range than the twin-engined fighters had a chance of intercepting. But there was always inevitably a lapse of time before the fighters reached the target that was being bombed; the bombers were comparatively immune from attack during the first quarter of an hour or twenty minutes, but then the fighters began to arrive in large numbers. Bomber Command's reply was to increase the concentration of the bombers, both in time and space. Instead of the bombers coming over the target at a rate of about 800 an hour, they now attacked at a rate of about 1,800 an hour, and were generally on the homeward run before the fighters arrived; no attack now took longer than 15 to 20 minutes; and, to make doubly sure, feint attacks were carried out, and at the same time the bombers were so routed as to suggest to the enemy that they were approaching a target which, in fact, they did not bomb.

When the enemy found that he could seldom get his fighters to the bomber's target in time, he improved his methods of plotting the course of the bomber stream overland and aimed to get the fighters into the stream as soon as possible after the bombers had made landfall. The fighters were then to keep in the stream all the way to the target and back again to the coast, making as many interceptions as possible. This plan was very dependent on the efficiency of the early warning system and on basing the fighters over a wide area so that they could converge from all directions on the bomber stream. It proved an uncertain method, but if the fighters did succeed in getting into the stream, and if the weather or other conditions were suitable for interception, more bombers were shot down on these few occasions than in any single night before. Casualties were very heavy on certain operations, though the overall casualty rate did not increase; the heaviest loss of all was on the night of 30th March, 1944, when 96 aircraft were missing out of a force of about 800 attacking Nuremburg, but only nine were missing out of a force of more than 700 attacking Essen on the night of 26th March, 1944.

Vigorous measures were at once put in hand to oppose these new tactics. Experienced Mosquito night-fighter crews, originally trained to operate with Fighter Command over Germany against enemy bombers flying to attack this country, flew with the bomber stream and shot down or chased away the night fighters. The number of feint attacks was also increased and by the time the Germans discovered which were the genuine targets it was usually too late to send the fighters to the real bomber stream. The bombers engaged in these feint attacks were widely dispersed in space and could take incessant and complicated evasive action and because of this their casualties were light, even when they had the greater part of the enemy's night-fighter force flying with them and after them. The tactics of putting the night fighters into the bomber stream was the enemy's last serious attempt to defeat the night bombers by

attrition. Henceforth the night bombers always

kept the upper hand.

Bomber Command flew 100,000 sorties by night during 1944, and losses were only 2.2 per cent. This marked improvement over 1943 was largely due to ingenious tactics and scientific devices, but the arrival of the Allied armies on the German frontier in the early autumn was another very serious blow to the enemy's early warning system.

Furthermore, there were other advantages to be gained from "mass" as opposed to formation flying at night. Anti-aircraft fire is less effective against bombers flying in a stream. Another advantage is that bombing by aircraft flying in a stream is far more accurate and concentrated than bombing by aircraft in formation.

The complete air superiority gained for the landings in France also enabled Bomber Command to operate in great strength by day. Although the loose stream of night bombers was not easy for fighters to protect in daylight-Bomber Command crews had never been trained to fly in formation and their aircraft were necessarily dispersed over a wider area than the heavy bombers of the U.S.A.A.F.there was now little chance of the enemy's day fighters risking combat unless the bombers wentfar into Germany and beyond the range in which Allied air superiority was absolute. As the Allied armies advanced, Bomber Command was able to make daylight attacks deeper into Germany, but all really long-range attacks were made by Bomber Command in darkness until the end of the war with Germany.

By 1941, as has been said, the Germans recognized that the anti-aircraft gun could not be their main defence against aircraft flying high and by night. But this does not mean that flak was not, at all times, a serious danger to the bomber crews, or that the enemy ever ceased to protect his industrial cities and other targets with great numbers of guns even when these were urgently needed by the army. The majority of German A.A. guns were dual-purpose weapons which could be used against tanks or as field-guns as well as against aircraft, and to keep those guns from the army was a serious step for the enemy. In 1943, 75 per cent. of all the enemy's heavy A.A. guns, mainly the 88 mm. gun, a most efficient anti-tank weapon, were engaged on the Western Front in air defence. But losses from enemy flak, during the main bomber offensive of 1943 onwards, were never heavy enough to affect the issue of the war of attrition between the night bomber and the German defences; flak only accounted for a high proportion of the casualties during the first two years of the war, when Bomber Command was inadequately equipped. Thus during 1942 losses from fighters and flak were about equal, though the fighters were probably already causing a few more casualties than the A.A. guns. But in 1943, 75 per cent. of Bomber Command's losses were from fighters and 25 per cent. from guns.

From 1942 onwards, concentration in time and space did much to reduce casualties from flak. A gun can only engage one aircraft at a time, and the more bombers overhead at any given moment, the smaller the proportion of the total force that can be hit. Shooting into the "crown" of the concentration is never effective, but this method of defence was forced upon the enemy because the concentration of aircraft made it impossible for the enemy to pick out a single aircraft for attack.

It will be seen that air supremacy for the bomber by night is a very different thing from air supremacy by day. But both were equally vital to the defeat of Germany; each of Bomber Command's engagements in a prolonged and intricate campaign, the issue of which often hung in the balance, had to be won if night bombing was to prepare the way for the landings on the Continent, save our armies from the heavy casualties of the last war, and give continuous support at every stage of the land offensive until the defeat of Germany. Nor should the effect of night bombing on the Russian front be overlooked. Apart from the effect on this front of the destruction of large industrial areas in Germany and the direct support given to the Russian army by the bombing of Saxony in 1945, it was on the Russian front that the effect of depriving the German army of bomber support first showed itself, and this was the direct result of the enemy's switch from bomber to night-fighter production.

With air superiority by night the tactical problems of night bombing were very far from exhausted. It may now be said that in 1940 there was cause for grave anxiety about the results of our night attacks; only the most experienced crews were then able to find the target in darkness and a bomber force, as was projected, of more than a thousand aircraft could not be entirely manned by men of exceptional ability and years of experience. But as soon as the facts were fully understood, after a careful analysis of photographs taken from the aircraft during bombing, British science provided the answer; the first navigational aid used by the R.A.F. was, in fact, already in existence before the war, though the application of it to night bombing had not then been considered. Throughout 1941 the work of experiment and training went on, and by the spring of 1942 Bomber Command was ready to solve the problem of really accurate bombing of large industrial areas by night, by large numbers of aircraft and against heavy defences.

It so happened that the answer to the problem of finding the target was also the main answer to the enemy defences. Unless the navigator could tell where he was within a mile or so in relation to the target at any moment of the flight and could therefore see that the speed of the aircraft was adjusted to a precise time-table, it was impossible to achieve concentration of aircraft in time and space. And so the same device which allowed the navigator to find the target on a dark night made possible the planned and concentrated attack which, because of the growing strength of the night-fighter force, had become essential by 1942. The first attack of the war to be planned minute by minute in this fashion was carried out just before the general use of navigational aids. This was the attack on the Renault works on the night of 3rd March, 1942. It was far more rapid than any previous attack of equal weight, and every stage of the flight of every aircraft was planned and timed in advance. It was also the first obviously successful large-scale attack by night. But here a brilliant moon was the navigational aid, and it was one thing to operate over France and another to operate against all the German defences in such weather. The first large-scale attack with navigational aids was made a month later, against the port and U-boat centre of Lubeck, and the efficiency of the new methods was proved when the first German industrial centre went up in flames. For the concentration in time and space which navigational aids made possible in all weathers, which was necessary if all crews were to reach the target during the period when picked crews had made it visible by flares and fires, and which was essential as a protection against night-fighter attacks, was also the answer to the passive defence of targets in Germany; the fire brigades were completely powerless when enormous numbers of fire bombs were dropped within as short a time as half an hour. Seldom can a scientific invention have had a more profound effect on tactical development, and indeed, on the whole strategy of the war. For these new tactics were developed at a time when the only conceivable offensive action against Germany in the West was to bomb the enemy's war industries.

The thousand-bomber attack against Cologne was a test, on an even larger scale, of the new tactics which navigational aids made possible. And it would, in fact, have been impossible to despatch a force of this size without these aids. A force of 1,000 bombers could not have been handled at all unless the route and timing of each single aircraft could be arranged to the mile and the minute according to a predetermined plan. No other air force in the world could at that time have used anything like so

large a force in a single operation.

In spite of the great successes of 1942, the further development of navigational aids, and the formation of the Pathfinder Force during that year, it was not until 1943 that Bomber Command was sufficiently strong in four-engined aircraft to begin the main offensive against German war industry. And it was also in 1943 that the U.S.A.A.F. was ready to begin its strategic bombing campaign against targets in Germany. The joint plan of campaign was largely dictated by the equipment and training of both Air Forces and, as is well known, the obvious decision was made to attack the large industrial areas by night and the single war factories by day. A particular instance of the complementary role played by the two Air Forces in 1943 was in the attack on the German aircraft industry as a whole, when the R.A.F. attacked large industrial areas in which were many aircraft component factories, while the U.S.A.A.F. bombed the assembly plants built outside the towns in order to be immune from the attacks on industrial cities. It is known that this double attack proved a complete surprise to the enemy. He had anticipated losing factories in towns, but not outside them, and he therefore subjected his aircraft industry to the great strain of dispersing the larger plants. A Focke Wulf aircraft factory in Bremen, for example, was largely destroyed by Bomber Command in 1942, and under the new plan was set up again in open country in East Prussia. There it was destroyed by the U.S.A.A.F., rebuilt, destroyed again, evacuated back to Bremen with the approach of the Russian armies, and hit again by the R.A.F. when it got there,

By such exertions—and the history of many German synthetic oil plants is one of even more frequent catastrophies—the enemy was able to keep production going in some of the major war industries—V-weapons, aircraft, or synthetic oil—to which he decided, or was compelled, to give first priority. And not only the

dispersed factories, but all the more important factories in towns were repaired as often as they were damaged. All this was subjecting the enemy's war industry to an enormous strain, towards which the destruction of large industrial areas by Bomber Command, with all their factories and public utility services and the consequent loss of many millions of man-hours of skilled labour, contributed a very great deal. Clear proof of the strain to which the German aircraft industry was subjected by strategic bombing is provided by the enemy's decision made in 1943, to concentrate almost exclusively on single-engined aircraft, which naturally could be produced more economically than two-engined or four-engined aircraft. Their single-engined aircraft were to be used, not only for the air defence of Germany but for protection of the army, and for ground attack on the Allied armies and their communications; there were to be few, if any, actual bombers. But it is a significant fact that even in 1945 two-engined aircraft for use as night fighters were still on the production list.

Both Von Rundstedt and Kesselring have said that the main reason for Germany's defeat was the complete air superiority of the Allies. Their opinion may be tendentious, in that it is in the interest of the German general staff to argue that the German army was undefeated in the field, and only collapsed under the strain of bombing behind the lines. But in 1944, General Model, in a most secret order issued by the Supreme Command of Army Group B for distribution only down to Divisions, said that "Enemy No. 1 is the hostile air force, which because of its absolute superiority tries to destroy our spearheads of attacks and our artillery through fighter-bomber attacks and bomb carpets, and to render movements in the rear areas impossible." There could be no question of such a statement being made for any tendentious reason in a document of this nature. Goering himself gave it as his opinion that the chief reason why Germany lost the war was the "uninterrupted Allied air offensive." In fact, German military opinion of all shades of mind, is and has been that one of the main factors contributing to the defeat of Germany was, in Von Rundstedt's own words "the smashing of the home industrial areas by bombing."

But the effect of strategic bombing on the actual fighting capacity of the enemy was not a matter of regular progress; production of weapons was not cut in the same proportion as the acres of devastation in the industrial areas increased. On the contrary, the end of

production in most war industries came with a rush at the end, as the whole industrial organization suddenly broke under the strain. This is what one would have expected, and captured figures of production show that this is exactly what happened. The bombing of the Ruhr in 1943 caused a general decrease of about 20 per cent. of production in the steel industry of that area, but by 1945 production in the great Vereignigte Stahlwerke's steelworks had become almost negligible.

During 1943, Bomber Command was largely concerned with perfecting its tactics in the bombing of large industrial areas, but there were some significant exceptions. It was of such exceptional importance to destroy the Peenemunde V-weapon experimental station that a new technique for precision attack by night was used and a master-bomber directed the main force by radio-telephone. This planned as a special measure for exceptional attacks, or even for this attack alone; there were several reasons why it was not thought practicable to use such tactics repeatedly. The .Germans might jam the radio-transmission, they might broadcast misleading instructions as they did attempt on later occasions—and there were other objections to using these tactics against heavily defended targets deep in Germany. It was the master-bomber's task to come down low and assess the position of the target indicators dropped to guide the main force, a dangerous mission, and while he was making his check the main force would have to orbit the target, waiting for his instructions to attack. This might mean a considerable delay, during which night fighters would have time to arrive in strength, and there was also, of course, the chance that both the masterbomber's aircraft and that of his deputy would be shot down and the main force left without instructions.

But in the first months of 1944, Bomber Command had to prepare for the liberation of Europe, and it was realized that precision bombing of small targets would be essential for this task. During the first stages of the operation the greater number of targets would be in France, and there would not be the same objection to the use of master-bomber tactics against these as against targets in Germany. Small forces of picked crews accordingly attacked a number of factories in France, which in any case had become of great importance to the German aircraft and other war industries at this stage of the war, and the new tactics were perfected in a short time; everything was ready by March of 1944 for the bombing of French railway centres which was to prevent the German army from getting its reserves up to the beachhead in time to prevent the Allied armies from building up their strength. Master bombers were very thoroughly trained so as not to keep the main force waiting, equipment for radio-transmission was perfected, a system of giving instructions by code-words was worked out, and the flexibility of the striking force was proved when it passed immediately from attacking Berlin, the largest target in Germany, to the saturation by bombing of a single marshalling yard.

single marshalling yard.

A General Staff Officer in charge, up to October, 1944, of the Office of the General des Transportwesens West, has given his account of the difficulties experienced by the German Army as a result of our air attacks on the French railways. He said that the air offensive against the French railways, in his opinion, made a greater contribution to the defeat of the Wehrmacht in France than any other single factor.

The first effect of the offensive, according to the German staff officer, was to block lines along the Franco-Belgian frontier, roughly from Sedan to St. Omer. The first result of this was upon French war industry working for the German army. From the beginning of May, north-east to south-west traffic had been so paralysed that coal could not be brought from France but had to be got from the Saar and brought by east to west lines, then needed for exclusively military traffic. Before the offensive began in March, German military rail traffic into France, including traffic for the Todt organization building V-weapon sites and the defences of the Atlantic Wall, was at the rate of more than 100 trains a day, sixty or seventy of which went through the network of railways round Paris which, of course, was particularly heavily bombed. By the end of April, only forty-eight trains a day were getting through the Paris network, and by the end of May only thirty-two, of which twelve were Saar coal trains, so that purely military traffic was at the rate of only twenty trains a day. By the end of April the normal accumulation of trains in France held up because of air attack was 1,000 trains. Previously the normal accumulation was never more than 120 or 130 trains. The circular railway round Paris, the Grande-Ceinture, was so disorganized that for some time it was not even possible to move one division through the Paris area.

The staff officer gave a list of railway targets attacked, in order of their importance to the German army. These were:

(1) Major railway bridges.

(2) Railway centres, containing essential railway facilities in the following order of importance:

> (a) Locomotive servicing facilities, round houses, turn-tables, coaling facilities.

(b) Switching gear.

(c) Signals systems, including telephones.

(d) Marshalling and shunting facilities.

(3) Trains and railway lines attacked singly by fighter bombers.

This is precisely the order of priority in which the targets were set out for air attack when the offensive was planned by the Allied air staffs; the aiming points in marshalling yards were always chosen to cause the maximum damage to locomotive servicing facilities.

The German staff officer also said that the supply of the V-weapon sites was seriously interrupted by the disorganization of French railways.

The most severe test of Bomber Command's tactics of precision bombing came when the R.A.F. was asked to lay what Model calls a "bomb carpet" on enemy troop concentrations within a short distance of our own troops, in order to check a counter-attack or prepare for an Allied advance. Such attacks were most often made by day, but also by night, and experience showed that both were equally accurate; the bombing line behind which our own troops were to keep was no nearer the target area by day than by night. The importance which General Model attached to such attacks has already been shown, and in this instance Allied commanders were as well able to judge the effect of bombing as the enemy himself. Describing an attack on 18th July, when more than a thousand heavy bombers attacked German positions in the east of Caen to prepare for the Allied advance to Tilly and Vaucelles, Field-Marshal Montgomery said that "the effect of the air bombing was decisive and the spectacle terrific." When the enemy were trapped in the Falaise-Argentan pocket, after Bomber Command had dropped 4,000 tons of bombs on German troop concentrations, armour and guns, Field-Marshal Montgomery said: "As has been the case throughout the whole of this campaign, the air forces have been quite magnificent and have operated with the greatest intensity."

After D Day the commitments of R.A.F. Bomber Command were greater and more

varied than ever before, and the flexibility of its tactics was taxed to the utmost. A major campaign against V-weapon sites and supply depots had to be fought; the Command joined in the campaign against synthetic oil plants in Germany, begun by the U.S.A.A.F. a month or two before: naval targets multiplied and had to be frequently attacked to protect our convoys across the Channel; a new U-boat offensive threatened and had to be checked by minelaying and bombing; airfields had to be cratered to prepare for airborne landings; German industrial towns became tactical targets and had therefore to be more heavily bombed than ever before; Germany's main waterways had to be drained if railway interdiction inside Germany was to be effective; Walcheren had to be flooded in preparation for the battle for the port of Antwerp; direct support for the Russian offensive had to be given by bombing industrial areas in Saxony; block ships had to be sunk out of harm's way before they could obstruct ports which the Allied armies needed for their supplies; and railway viaducts had to be broken down before the Ruhr could be completely cut off from the rest of Germany. The targets ranged in size from a single gun emplacement or a ship to an industrial area of several square miles. The Command began to operate with equal strength in daylight and by night, and efficient Pathfinder tactics had to be worked out for bombing through cloud in daylight, or when the target was covered by dust and smoke. Improved methods of bombing large areas by night were also devised, and it proved in the end possible to use a masterbomber many hundreds of miles inside Germany.

Bomber Command's first and last targets of the war were naval, and the German navy itself and its bases have been constantly attacked for five and a half years as well as war industries producing for the German navy. The following major German naval units have been sunk or damaged by R.A.F. Bomber Command:

Tirpitz (Battleship).—After suffering damage in Naval and Fleet Air Arm attacks, was sunk at Tromso by 12,000-lb. bombs on 12th November, 1944.

Gneisenau (Battle Cruiser).—So heavily damaged by bombs and mines dropped by R.A.F. Bomber Command in 1942, that she was beyond repair and was dismantled at Gydnia.

Scharnhorst (Battle Cruiser).—Damaged by bombing when in Brest and at La Pallice.

Afterwards again damaged by mines dropped by Bomber Command. Sunk by the Navy on 26th December. 1943.

Koln (Light Cruiser). — Damaged in Oslo Fjord by bombs dropped by Bomber Command. Then forced to Wilhelmshaven for repair, where she was sunk on 30th March, 1945, by 8th U.S. Air Force.

Admiral Scheer (Pocket Battleship).—Sunk by Bomber Command in an attack on Kiel on the night of 9th April, 1945.

Lutzow (Pocket Battleship).—Sunk at Swinemunde by Bomber Command on 16th April, 1945.

Admiral Hipper (Heavy Cruiser).—Wrecked in dry dock at Kiel by four direct hits during attack by Bomber Command in April, 1945.

Emden (Cruiser).—Damaged by bombs and beached in Kiel fjord.

Prinz Eugen (Heavy Cruiser). — Bomb damage.

Schlesien.—Damaged by mines dropped by R.A.F. Bomber Command and beached at Swinemunde.

During the war 47,250 mines were dropped by Bomber Command. Over 40 per cent. of the German naval personnel were employed in minesweeping and mine watching. As a result of Bomber Command's minelaying operations more than a thousand ships are known to have been sunk or damaged, and the number of ships sunk exceeds that of ships damaged. These were vessels of all types; the more important of them, apart from U-boats, are listed below:

Destroyers: 1 sunk, 3 damaged. Torpedo boats: 3 sunk, 2 damaged. Speerbrechers: 15 sunk, 78 damaged.

M-Class minesweepers: 15 sunk, 31 damaged.

Merchant vessels over 15,000 tons: 4 sunk, 3 damaged.

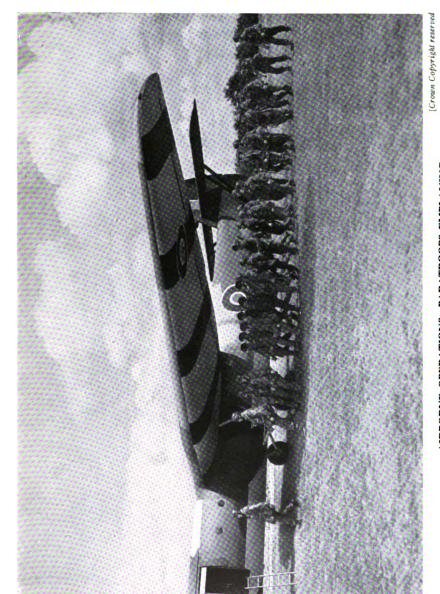
Merchant vessels between 4,000 and 10,000 tons: 46 sunk, 37 damaged.

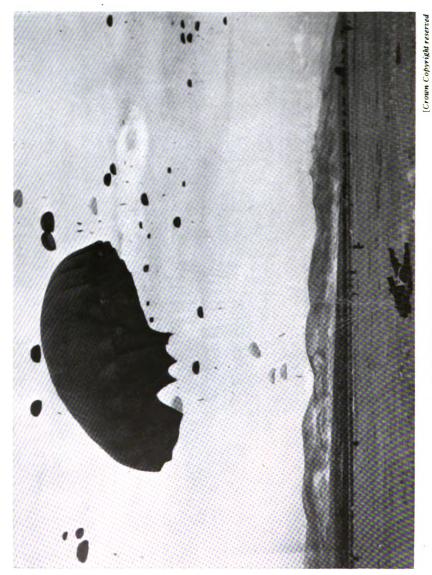
Merchant vessels between 1,000 and 4,000 tons: 123 sunk, 76 damaged.

At least 135 naval and naval auxiliary craft were destroyed or damaged in Le Havre and Boulogne in the course of three attacks.

E-boat shelters in enemy occupied ports were also effectively attacked with 22,000-lb. and 12,000-lb. bombs.

During the war aircraft of Bomber Command have made 392,137 sorties; 955,040 tons of bombs have been dropped, 657,674 on Germany and 297,366 elsewhere. 758,685 tons of





high-explosive bombs were dropped and 196,355 tons of incendiaries.

SOME NOTABLE DATES

1939

3rd September.—First war flight. Blenheim photographs German fleet on its way to Wilhelmshaven. First leaflets dropped.

4th September.—First bombing attack. 29 Blenheims and Wellingtons attack German warships at Brunsbuttel.

1940

19th March.—First bombs dropped on German soil. Night attack on German seaplane base on the Island of Sylt.

13th April.—First mine laid in enemy waters.

- 11th May.—First bombs dropped on German mainland. 18 Whitleys attacked railways at Munchen-Gladbach.
- 11th June.—First attack on targets in Italy. 12th/13th August.—Attack on Dortmund Ems
- 25th August.—First attack on Berlin. This was carried out by five Wellingtons.

1941

31st March.—First 4,000-lb. bomb dropped. The target was Emden.

1942

3rd March.—Successful attack on the Renault works at Paris.

10th April.—First 8,000-lb. bomb dropped. The target was Essen.

17th April.—Daylight attack by Lancasters on M.A.N. works at Augsburg.

30th May.—Thousand-bomber attack on Col-

22nd October.—First attack by more than 100 aircraft on Italy. The target was Genoa.

24th October.—Daylight attack on Milan by 88 Lancasters.

1943

16th February. — Total weight of bombs dropped by Bomber Command reaches 100,000 tons.

5th March.—Beginning of the Battle of the Ruhr with a heavy attack on Essen.

16th May. — The Mohne and Eder dams breached by Lancasters.

24th July to 2nd August.—Battle of Hamburg. 17th August.—First attack against V-weapons. Peenemunde research establishment and factory heavily bombed.

15th September.—First 12,000-lb. blast bomb

dropped.

22nd September.—First diversionary attack. A feint attack was made on Oldenburg to mislead enemy night fighters while the main force attacked Hanover.

8th October.—Wellingtons operated for the last time with Bomber Command, having been used continuously since the beginning of the

18th November.—Beginning of the Battle of Berlin. Mannheim was also attacked and for the first time two German industrial cities were heavily bombed on a single night.

16th December. — Intruder aircraft (Beaufighters and Mosquito night fighters) operated for the first time with Bomber Command.

23rd December. — Total weight of bombs dropped by Bomber Command reaches 200,000 tons.

24th December. — 25,000th sea mine laid in enemy waters.

1944

23rd February.—Mosquitos dropped 4,000-lb. bombs for the first time.

12th May.—Mosquitos dropped sea-mines for the first time.

5th June.—Bomber Command dropped nearly 5,500 tons of bombs on ten coastal batteries on the coast of Normandy on the eve of D Day.

8th June.—12,000-lb. "earthquake" bombs

dropped on Saumur tunnel.

14th June.—First of a long series of daylight attacks after the invasion of Europe. Almost all German naval units in Le Havre des-

30th June.—First attack on a target in the battle area in close support of the army. German troop concentrations bombed at Villers Bocage.

18th July.—More than 1,000 heavy bombers dropped more than 5,000 tons of bombs on enemy troop concentrations and fortified positions near Caen.

4th August.—Total weight of bombs dropped reaches 500,000 tons.

27th August.—First heavy daylight attack, with fighter escort, on target in Germany. Synthetic oil plant at Homberg attacked.

23rd September. — Dortmund - Ems Canal breached and drained.

14th October.—Greatest weight of bombs— 10,301 tons—dropped in any single period of 24 hours and greatest weight—5,453 tons dropped on any single night.

12th November.—The Tirpitz sunk by Lancas-

ters with 12,000-lb, bombs.

16th November.—Close support given to U.S. army for the first time. Julich, Duren and Heinsburg attacked. Greatest weight of bombs—5,689 tons—dropped on any one day.

1945

14th March.—Ten-ton bomb dropped for the first time. The target was the railway viaduct at Bielefeld.

21st March.—Largest force of Mosquitos attack Berlin.

24th March.—Day and night attacks on Wesel to precede the crossing of the Rhine.

9th April.—Pocket battleship Admiral Scheer sunk.

16th April.—Pocket battleship Lutzow sunk.

25th April.—Daylight attack on Hitler's chalet and S.S. barracks near Berchtesgaden.

29th April.—Bomber Command begins dropping food supplies in Holland.

The Harvest of Air/Sea Rescue

THE total number of R.A.F. and American aircrew saved by the Air/Sea Rescue Service in the waters around Great Britain, during the period between February, 1941, when the Directorate was formed, and the end of the war against Germany was 5,721. Of this total 1,992 were Americans.

Overseas, A.S.R. units rescued approximately 3,300 aircrew—a conservative figure in view of the fact that accurate records were not kept in the early days of the war.

In addition, during the same period, A.S.R. saved 4,665 soldiers, sailors and civilians in areas other than the seas around Britain.

From a local rescue service, organized to operate during the Battle of Britain, A.S.R. evolved into the Air Ministry Directorate of February, 1941.

It is by no means an exclusively R.A.F. organization. From the very beginning it has been closely identified with the Admiralty, the Royal Navy having played a very prominent part in the work. Other Services which closely co-operated throughout the war included Trinity House, Royal National Lifeboat Institution, G.P.O., Northern and Irish Lighthouse Boards, Royal Observer Corps, Board of Trade, Merchant and Fishing Fleets, coastguards, police and, of course, all R.A.F. operational Commands.

Facts and figures show A.S.R. to have played a vital role in restoring to active service a large number of highly-trained personnel. The improvized rescue service ultimately developed into the highly specialized organization playing an individual role in D Day invasions, when 136 R.A.F. craft, a large number of Naval craft and sixty U.S. coastal cutters were operating in the invasion areas alone.

The story of A.S.R. is a story of constant

adaptation to the needs of air warfare against a German-held Continent. In the opening stages of the Battle of Britain fighter-pilots had nothing but their Mae Wests, although all but single-engined R.A.F. aircraft were equipped with rubber dinghies. Early aircraft losses in the sea led to the formation of a local rescue service at Dover, operated by R.A.F. high-speed launches, naval craft and eight Lysanders borrowed from Army Co-operation Command.

At this stage the Luftwaffe was better equipped in the rescue sphere, and a number of emergency floats, stored with the means to preserve life, were stationed along the Channel coast. All German aircrew were also provided with dinghies and a radio for distress signals. One of their fighter-pilot dinghies was captured and greatly improved upon by the British Service. A captured radio was also used in like manner.

R.A.F. rescues near the enemy coast were very rare. Until the enemy lost his coastline there were a number of occasions when the lives of R.A.F. or American aircrew were saved by the enemy's rescue service in response to an international distress signal.

Early in 1941 sixteen floats were established along the British coast on the same lines as the German rafts. These proved helpful from the point of view of morale but although visited, from time to time, no aircrew was ever found to have taken refuge on them. One had become the home of a pair of seals.

In the early days a certain amount of chivalry existed between the German and British rescue services, but in August, 1941, the enemy attacked two R.A.F. high-speed launches and sunk them both. The two .303 guns on these craft were then replaced by four Brownings, but throughout the war crews were under

orders not to attack but only to defend themselves when necessary.

With the formation of an Air Ministry Directorate of A.S.R. in February, 1941, rapid strides were made in the development of the rescue system and rescue apparatus. By September of that year the Rescue Service had twenty-four Lysanders and nine Walrus aircraft, the latter capable of coming down on the water close to a drifting crew. By March, 1942, its quota of high-speed launches had been augmented by a further fifty Fairmile launches from the Admiralty. In a single year the number of R.A.F. aircraft operating in this Service had increased by sixty-five.

One of the earliest developments in the means of dropping succour to ditched crews was the "Thornaby Bag," named after R.A.F. Station Thornaby, where it was invented. This was a container of food and first-aid. Subsequently, the "Bircham Barrel" (named after R.A.F. Station Bircham Newton) proved a more robust development of this idea, made from the container of a 250-lb. bomb. This was an improvement on the Thornaby Bag but even more successful was the "Lindholme Dinghy," devised at R.A.F. Station Lindholme. This consisted of a large and well-equipped dinghy to which survivors could transfer, and a string of four containers stocked with food, warm clothing and distress signals. Dinghy and containers were dropped to windward of the stranded men, who could help themselves to the food and clothing after transferring to the dinghy.

Meanwhile the "K" type dinghy had been issued to fighter-pilots. This was attached to their parachute harness and inflated immediately they entered the water and cast off parachute harness.

After a number of drifting aircrew had been found dead in their dinghies, due to severe exposure and consequent lack of a will to live, it was decided to equip dinghies with sails. These not only enabled the crew to make some progress towards land but were an important factor in sustaining morale.

The first operation in which the Rescue Service officially took part was Dieppe, in August, 1942. Their launches saved a number of aircrew, but three high-speed launches were sunk, with the loss of two officers and eighteen other ranks. By this time the Service had been extended to American aircrews, who began to arrive in Britain in ever-increasing numbers during 1942. American airmen, accustomed to flying over vast tracts of land, had been conditioned to bale out if their chances of getting the aircraft home were remote. They were un-

accustomed to flying over sea and were untrained and not particularly well-equipped for ditching. In the early stages of their day offensive the A.S.R. not only loaned the Americans a great deal of equipment but instituted training in the art of using every means then known to sustain life until rescued.

American fighter pilots were given "K" dinghies and British parachute harness. They were also issued with British Mae Wests, which had the advantage of a pad behind the neck to prevent the head falling back in the water if the wearer lost consciousness.

The first occasion Americans were rescued by A.S.R. was on 9th October, 1942, when a Fortress crew, returning from Lille, ditched off the North Foreland. One of their two dinghies had been damaged but the nine men kept afloat and were rescued by launches in ninety minutes, after a passing Spitfire had radioed their position.

One of the A.S.R.'s busiest days in respect of U.S. rescues was in July, 1943, when the heavy American daylight attacks had opened against the Continent. In that month they saved 139 members of Fortress crews out of a total of 196. On 25th July they saved 78 out of 80. Their work earned warm thanks and congratulations on the part of General Anderson, of the 8th U.S.A.A.F. Six weeks later, in a period of two days, the Service rescued 118 out of 121 American fliers.

In September, 1943, U.S. aircraft were made available to join in searches for any Allied aircrew known to have ditched in the Channel. By May, 1944, the Americans had their own Emergency Rescue Squadron, composed of twenty-five P.47s.

Greatest single development in the work of A.S.R. was the airborne lifeboat, which had evolved after a considerable period of research and experiment. It was first employed off the Humber, in May, 1943, when the crew of a Halifax boarded a lifeboat dropped by parachute and navigated their way towards land until picked up by launches.

One of the chief advantages of the airborne lifeboat over previous means of assisting aircrews adrift, is that it afforded them a much better chance of getting away from the neighbourhood of an enemy coast and returning under their own steam. Incidentally, it avoids the risk of sacrificing lives in rescue attempts carried out under enemy fire. The venture has proved a very great success.

The fifth drop—and the first to an American crew—took place seventy-seven miles north-west of Borkum, Denmark, where a For-

tress crew climbed aboard and navigated their way towards Britain until picked up by a Danish fishing vessel. The next day, 28th July, a second American crew was rescued by an airborne lifeboat, dropped near the same spot. This party cruised 100 miles before being picked up.

Perhaps the most perfect illustration of the use of an airborne lifeboat in sustaining life occurred on 7th January, 1944, when the crew of a Mosquito ditched 200 miles south of the Scilly Isles in very bad weather. After surviving a grim ordeal in their dinghy they boarded the lifeboat dropped by a Warwick some 180 miles out to sea. They were afloat nearly four days and four nights and were picked up in excellent physical condition, due to the good use made of the equipment they found on board. Altogether they cruised 200 miles from the spot where their aircraft came down.

A later addition to the equipment of dinghies was the de-salting kit. For years experiments had been made to enable shipwrecked men to convert salt water into drinking water, but the apparatus up to this time proved far too cumbersome for carriage in aircraft.

At last a simpler method was found. By using chemical reagents a dinghy crew was enabled to produce 4½ pints of drinking water from equipment which took up the space of a single can of stored drinking water.

"Gadgets," which often saved life, included sea-dye tablets for attracting the notice of search aircraft, floating knives, floating torches, waterproofed matches and a variety of distress signals.

In spite of vast D Day preparations on the part of A.S.R., 6th June, 1944, did not prove an exceptionally busy day; far busier was the Arnhem period, when a new peak was reached in the rescue of 181 airborne troops. The Rhine crossings involved much less work, two glider

crews being rescued when their aircraft came down in the sea. On that occasion also there was a very extensive A.S.R. coverage, and aircraft participating in the operations reported that it was not necessary to navigate aircraft to the dropping zones—the course could be followed by observing high-speed launch tracks.

Malta improvized an A.S.R. service and in the summer and autumn of 1941, whilst under ceaseless air attack, the local A.S.R. rescued thirty R.A.F. pilots. The return of these men to the island proved a vital factor in the defence.

In the Middle East a local A.S.R. flight had been operating since the entry of Italy into the war and up to the end of the Desert campaign this service achieved excellent results. A good deal of its rescue work took place in the desert, where stranded pilots and bomber crews were as helpless as if they had fallen into the Mediterranean. During a brief period up to the time the Middle East flight was incorporated into the official organization, it saved 193 aircrew from the sea and 131 from the desert.

In the Far East A.S.R. development was handicapped by shortage of equipment in the early days of the struggle against Japan. The demands of the struggle in Europe made extension of A.S.R. facilities in the Far East quite impossible when the Japanese poured into Burma at the end of 1941. The A.S.R. organization at Singapore with a single high-speed launch and home-made equipment, rescued a total of twenty-three pilots in the two months December, 1941, and January, 1942. The unit disappeared when Singapore fell to the enemy.

Sometimes, in five years of war, A.S.R. personnel made headlines. Perhaps the most memorable occasion was when Sergt. Cohen, flying an A.S.R. Swordfish, landed on Lampedusa, the Mediterranean Isle, during a heavy bombing assault. He ordered the garrison to refuel his aircraft, took off, and reported the island's surrender to his headquarters.

John Alexander Powell

By HILARY St. GEORGE SAUNDERS

"They shall rise up as eagles."

THE July day had fulfilled the shining promise of its morning when I climbed out of the Stinson and first set foot on the grass at Feltwell. The clear summer light pouring down upon the wide expanse illumined the old-fashioned hangars, whose only inhabitants were aircraft under repair in the hands of untiring, unhurrying ground crews, and threw into strong relief the four-square bulk of the Watch Office in the foreground. Behind and to either side, very far away at the dim edge of the perimeter, the sharp tail-fins of Wellingtons pricked the sky, their wings and bodies hidden by the hardly perceptible curve of the field.

In a few moments I was on my way to the Mess and to half a can at the side of the Commander of this remote East Anglian airfield, destined in the next year to be placed very high, by reason of his fierce skill and indefatigable prowess, on the list of those Royal Air Force bomber stations held by the Germans to be the most dangerous to their country and

their cause.

Group-Captain John Alexander Powell. whom the Service, perpetuating a nickname first bestowed at Cranwell, called "Speedy" and his more intimate friends "James" or "Jimmy," was then thirty-two years of age. He had been promoted a few days before, and at the beginning of the year—it was 1941—had been admitted to the Order of the British Empire and to the Distinguished Service Order. The first distinction had been awarded him for three and a half years' work training the Southern Rhodesia Air Force. The second he won when, commanding No. 149 Squadron, he carried out an attack, on 11th/12th January, 1941, on the oil refineries at Porto Marghera, near Venice. Soon he was to be known throughout England, then throughout the world—except in the "abodes of the guilty" where his reputation was established by other and more explosive means—through the medium of the screen, for he played the part of Wing Commander in the film "Target for To-night," then about to achieve world-wide success.

Above middle height but not unduly tall, his fair hair, his eyes of an uncompromising hazel, and the set of a remarkably determined jaw, made Jimmy Powell at first sight such a figure as Ouida might have described had she lived on into the age of flight. This appearance I soon

found he strove, consciously or unconsciously, to counteract by using on all possible occasions a quiet, almost gentle tone of voice, though it was crisp enough when he chose to make it so. His movements were quick and decided and he was very light on his feet. Assured of manner but altogether devoid of arrogance, he had about him that air as easy to recognize as it is hard to define, which belongs only to the leaders of men. Nor did first impressions alter. They remained and deepened, and as I became admitted to the honour and delight of his friendship I became aware that here was a man whom Harry of Monmouth would have welcomed on St. Crispin's Day, and Francis Drake hailed with a roar of delight on his way from the bowling green to the quarterdeck of the Revenge.

Let me first write of his deeds, for they proclaim the man. Born at Maidstone in 1909, he was educated at St. George's School, Quebec, Lachine School, Montreal, and at Munro College, Jamaica. His Service career began in 1929 when he left Cranwell commissioned as a Pilot Officer in No. 56 fighter squadron. To be able to handle a fighter aircraft, however, was not, in his view, the whole duty of a professional airman, and he was soon found enquiring into the mysteries of navigation. These mastered, he became a flying instructor and presently, as such, took over command of the Oxford University squadron of the Auxiliary Air Force. He lived in Christ Church, well content with the fate that made him a member of so ancient and honourable a foundation, for he soon fell a very willing victim to the charm and grace of Oxford.

His next task was more strenuous and was to be performed many thousands of miles from the city of spires and bells. In June, 1937, he was sent, as a Flight Lieutenant, to Southern Rhodesia. There, as the young instructor of a young air force in a young country, during a period when the sounds and signs of war grew ever louder and more apparent, Jimmy Powell laboured with a genial ferocity of purpose that in a little more than three years increased the Force to 1,500 well-trained men.

They were years as happy as those which had preceded them at Oxford, for there was much to do, and to discerning eyes—and his were very keen—time was short. All the com-

plicated training of a pilot was in his hands, and since his pupils were voluntary, having to spend the greater part of the day earning their living in various ways, instruction could be given for the most part only in the early morning or the late afternoon. Despite a protest or two delivered anonymously in the public prints by lie-abeds who objected to the habit of the Rhodesian Air Force of "practising warfare" while they were still trying to "recuperate from repeated mosquito attacks" sustained in the hours of darkness, he presently brought this small Air Force to a degree of efficiency which permitted co-operation with the Territorial Army. On 10th September, 1938, "a first-class demonstration of air co-operation with infantry was given to the Rhodesia Regiment in camp at Gwelo." On the march, behind their band, they were repeatedly dive-bombed and machine-gunned till they learnt to scatter and take cover in "about three seconds. . . . Vigorous detonations of the big drum beneath a thorn bush turned out to be the big drummer, a man of imagination, impersonating an anti-aircraft battery all on his own." The Hawker-Harts, diving in the African sunshine of that September day, "throttle full open and probably touching a maximum speed of 157 miles an hour" were the hardy forebears of those Typhoons, Spitfires and Mustangs which six years later strewed the roads of Normandy with the corpses and wrecked vehicles of a great German army. Jimmy was in Italy when this grim chapter in the tale of victory was being written, but there were Rhodesian pilots in action with the avenging squadrons that in those hot August days showed so many Germans the way to dusty death.

The outbreak of war found him still in the midst of his labours in Rhodesia, but presently the Empire Air Training Scheme began to develop in earnest and Jimmy Powell was able to quit Salisbury, Rhodesia, for the wide fields and windy skies of East Anglia. By the beginning of 1941 he was a Wing Commander and the squadron he commanded was No. 149, flying Wellingtons. He was soon to make it famous. At that time, though persistent and determined, the attacks made by Bomber Command on the Axis powers could cause little but annoyance. Three years and more were to pass before they assumed that power and ferocity which made them the greatest single cause of our victory.

From the outset Jimmy Powell had decided views on how bombers should attack their targets. It was useless, he maintained, to hope to hit more than an area from a height of several thousand feet. If a factory, or railway junction,

or oil storage depot, was the object of attack, then the bombs must be dropped from a low altitude in order to make quite certain that it would be hit. "Go in low" was the precept that he practised himself and preached, in season and out of season, to all his pilots. The result was soon apparent in the effects they achieved, and the climax came one day when one of them, his great friend Sawrey Cookson, who before his death in action was to win the D.S.O. and D.F.C., returned with ninety-eight holes in his Wellington as proof that he had followed the precepts of his commander. Attack from a low level not only increased the chances of hitting the target, but also of finding it. This, too, Jimmy Powell never ceased to proclaim, and he was accustomed to add that a small bomber force, such as ours then was, could not afford to waste bombs, for the amount of damage that it could do was "limited anyway, since we haven't got nearly enough bombers—yet."

These principles, which he most faithfully followed in each of the sorties he flew with No. 149 Squadron, was never more brilliantly demonstrated than on the night of 11th/12th January, 1941, when he won admission to the Distinguished Service Order. On that night he took his squadron to Porto Marghera, near Venice, the second occasion on which the petroleum refining industries in that town had been attacked. The leading Wellingtons set the target on fire by incendiaries, thus imitating, though they did not know it, the practice followed with such success by the Pathfinders two years afterwards. As soon as the target was well alight the anti-aircraft defences cowed machine-gun fire from a few hundred feet. " a heavy bomb was released from a very low level and blew up one of the large refinery buildings." The pilot of the aircraft from which it fell was Jimmy Powell. Here, in his own words, is the story of what happened:

"By the time we got to the Alps," he said, "the valleys were just begining to fill with fog, but the peaks stood out in the moonlight as clear as though it were day. I should say you could see a hundred miles, it was so clear.

"There was fog, too, over the foothills on the other side. It looked like a great sea of ice with the high ground standing up like islands. The plains of Lombardy were also completely covered by fog. Then, as we neared the Adriatic coast, the fog disappeared and when we got to Venice, flying up-moon, it was again like day. I'd more or less made up my mind all along to go down low and the moment we got over the Alps I had started losing height. Over Venice we circled round to draw their fire and

see how much there was. They had quite a lot of light stuff. Some of it was pretty accurate towards the end. Having seen how much there was I decided to go right down. We flew over Mestre, whistling among the chimneys. There was a sort of fort or citadel outside Mestre and two sentries standing on the ramparts had a crack at us. We could see them standing up with levelled rifles. I'd given orders to the front and rear gunners that they were to fire back at anybody who fired at us and they opened up on the sentries.

"The time now was round about 2 a.m., yet it was so light that one could see people in the street. I heaved the aircraft over a couple of factory chimney-stacks; then we started to climb to do the bombing. We went up to 700 feet. We were carrying one of our heaviest bombs, and when it burst it very nearly blew us out of the air. The bomb landed either on or beside a large building with a lot of pipes all round it. There was a colossal belt of smoke and flame which shot up almost level with the aircraft. The smoke died away but the flames persisted. Then there were a couple of great explosions. We went round again and dropped the other bombs in the middle of the flame, adding to it by half as much again.

"I knew of an aerodrome about twenty miles away at Padua so we went whistling along the railway tracks at about nought feet to find it. We passed three trains on the way. We were

flying right alongside them.

"We flew over Padua itself, again doing tight turns round the chimneys and church spires, and having dropped our leaflets there we flew on to Padua aerodrome where the front and rear gunners let fly, left, right and centre, at the hangars. We streaked across the aerodrome at twenty feet. We could see there were no aircraft dispersed around the aerodrome so we assumed that they were in the hangars. Immediately we came on to the scene the aerodrome defences opened up on us. Tracer was flying alongside almost parallel with us. I was dodging behind the trees to get cover.

"I had wanted to have a crack at another aerodrome but there wasn't much time and we'd got the Alps to cross again so we left it at that

and came away.'

In talking of this exploit months afterwards he maintained that his bomb-aimer had misheard him over the intercom and when they were at 700 feet above the ".large building with a lot of pipes all round it" had dropped, not a 500 lb. bomb as ordered, but the big 1,000 lb. bomb which the Wellington was carrying. The blast, which "very nearly blew us out of the

air," in fact turned the Wellington upside down.

By April, 1941, Jimmy Powell's tour of command of No. 149 Squadron had come to an end. He was due to command a station, and after three months on a staff appointment he was promoted to the rank of Group Captain and in August, 1941, given Feltwell, the base of No. 57 Squadron and No. 75 (New Zealand) Squadron. Here, not so many miles away from Mildenhall, from which he had first set out against the enemy, he continued to practise the same principles on a somewhat wider scale. The station soon became renowned for the steadfastness with which the squadrons based on it maintained their offensive against the enemy. That offensive was growing larger now. In December, 1941, Hamburg received more than 150 tons, then considered a very heavy load of bombs. Jimmy was there. A month or two later he took part in a raid on Essen, during which the pilot of one of his Wellingtons saw an explosion which spread "like liquid fire or like milk splashing about."

At Easter-time, 1942, Jimmy took part in a particularly hazardous attack against a marshalling yard in North-West Germany. Once again he followed his usual practice of coming in low. This, according to a member of his crew, is what happened:

"Just before we got to the Rhine there were great black, thundery-looking clouds everywhere. We sailed on and it got blacker and blacker. Rain and sleet lashed the aircraft. The front gunner was partly covered in it.

"We could see nothing of the ground so when we thought we were near our target the Group Captain decided to go down. As we gradually edged our way the general blackness became a little lighter in parts and we finally got right out of the cloud. We flew round a bit and eventually picked up a railway.

"We went up and down the railway lines until we found a marshalling yard, which we

bombed from a low level.

"Our second bomb went right on to a goods

train standing in the yard.

"Our gunners were having a crack at the signal box and signal lights. One fellow on the ground fired a rifle at us. After we had gone round about four times the weather became so frightful that the Group Captain gave the orders for the remainder of the bombs to be dropped in two sticks.

"We could see fire creeping right along the goods train we had hit. We were so low we could hear the bombs burst and we felt the blast.

"As we made for home the weather got

worse. The whole of the countryside was darkened by a great storm. It took four-and-aquarter hours to get back."

Despite the daily or, more accurately, the nightly task of putting his bombers into the air against Germany, of leading them whenever he could, and of maintaining as many of them as possible always available for instant duty, he found time to discuss with me that old problem: how to make sure of hitting the target. This had obsessed him from the start of his active service career, and now, in those days and nights of hustle and ordered haste, he propounded a scheme which in almost all respects was exactly similar to the Pathfinder organization set up with such brilliant success by Air Vice-Marshal Bennett a few months later. He even wrote it down-I was his amanuensisand sent it to the appropriate authorities in the form of a short memorandum. In this he urged that the problem could be solved by a combination of skill, which meant accurate navigation. and determination, which meant a cold, unemotional courage enabling a pilot to fly through any density of flak and to go in low. What happened to the memorandum I do not know. What happened to the Pathfinders is known to all the world; their share in our victory can justly be called incalculable.

It was on that occasion that Jimmy Powell landed at Manston with petrol for only another minute's flying left. It was about this time, too, that his great friend and staunch comrade, Sawrey Cookson, by then commanding No. 75 Squadron, lost his life in an attack on Cologne.

The climax of Jimmy's career at Feltwell was perhaps the night of 30th/31st May, 1942, when he despatched forty-four Wellingtons to take part in the first 1,000-bomber raid on Cologne. He did not fly himself on that occasion, having received express orders forbidding him to do so. (He was always getting into trouble for "going on Ops" as a Group Captain. Altogether, while in England, he completed some twenty sorties against the enemy when holding that rank.) But he despatched each of those forty-four aircraft himself, standing with the signal lamp at the end of the flarepath and giving them a green in such rapid succession that three Wellingtons were on the runway at the same time, separated by no more than three hundred yards. When it was performed, this feat, carried out in the dusk of a lovely May day, was remarkable for its precision and timing. It was, of course, many times repeated but never surpassed in the later stages of the war, when raids of similar strength were a nightly occurrence.

Not long after this first mass attack on Cologne, Jimmy was transferred to larger responsibilities at his old station at Mildenhall. where he had under him three airfields. It was during the early part of that winter that I stayed some weeks with him while I was engaged on writing the official book "Combined Operations," and it was then that I came to know him most intimately. With the exception of brief periods of leave he had been continuously directing his share of the battle and taking a frequent part in it for nearly two years, but his energies were as great as ever and his strength seemingly inexhaustible. Whenever any of his squadrons were on operations—the nights when all of them were standing down were very few —he took at most four hours' sleep in the twenty-four. By then, too, that singleness of purpose I had observed in him when we first met was burning with a bright, all-consuming flame. It had transformed him from a supremely skilful, entirely competent airman utterly content with his profession, into a fanatic of the type made famous in the last war by Mannock.

By the time the red marker flares of the Pathfinders he had envisaged and the thousand gleams of their incendiary bombs were lighting the targets chosen for destruction in Essen, Cologne, Hamburg, Berlin, and half a hundred other German towns, Jimmy was far away to the southward carrying out what was perhaps the most important task he fulfilled in the war. Early in 1943 he joined Major-General J. H. Doolittle, then commanding the Mediterranean Strategical Air Force in North Africa. Before long he was leading Wellingtons in one of the earliest close-support operations carried out by heavy bombers. The occasion was the invasion of Sicily, and on the night of 9th July, 1943, while the British 1st Airborne Division and the American Airborne Troops were sliding or falling through the darkness on to the windswept shores of Sicily, Jimmy Powell and his Wellingtons were laying down a carpet of bombs on a narrow neck of land 1,000 yards wide and 2,500 yards long near the city of Syracuse. "There was no wild bombing, said. "Each individual stick could be seen going down criss-crossing with the next. It was the finest precision-bombing I have ever seen." That night indeed he received his reward, not from the hands of men but from his own heart. for he saw with his own eyes the flaming vindication of all his theories, maintained so patiently and with such unstinted enthusiasm. "With your splendid bombing," wrote Doolittle to the Wellington squadrons, "of all the ports of disembarkation, the enemy's head was kept down.

Your efforts contributed greatly to the success of the Sicilian campaign." By the time these words appeared in the General's Order of the Day, Jimmy Powell's Wellingtons had flown 3.020 sorties.

In the next two months those same Wellingtons bombed airfields, barges, bridges, railways and ships throughout the length and breadth of Italy and around her coasts. When at length she whined for mercy and crept out of a war which she had hoped to wage without fighting, Jimmy Powell's tasks were changed. A member of Doolittle's staff, he had much to do with the planning of those long-range daylight bombing operations on the home of the Messerschmitt at Wiener-Neustadt and other important targets in Austria. Once more he could not remain content with planning. He must go to see for himself, and he who three years before had begun his bombing career in the watches of a fiery night nearly ended it at high noon. One day in October he went out in a Liberator belonging to a force sent to attack an aircraft factory near Vienna. The aircraft reached the target, made two runs across it, and dropped its bombs. On the way home, high above the Alps, it ran into enemy fighters. A brisk battle ensued in which the bombardier was killed and the pilot, co-pilot and navigator wounded. One of the pilot's legs was found to be hanging by a thread, and he was also hit in the head. They lifted him up and laid him in the flak-torn fuselage. Into his seat slid Jimmy Powell. He had never flown a Liberator before, but seventeen years of flying all kinds of aircraft in all kinds of conditions were behind him as he took over the blood-spattered controls. One of the starboard engines had been hit by flak and was silent. Three fires were still burning in the Liberator, but Jimmy kept her in the air and "managed, through a superb display of professional skill and leadership to bring plane and crew back to friendly territory for a safe crashlanding without further injury." This he did, though at the moment of landing "only one engine remained operative. For this feat of skill and courage Jimmy was awarded the American Distinguished Flying Cross. In order to justify its bestowal, "the heroism," says the American definition of the honour, "must be evidenced by voluntary action in the face of great danger above and beyond the line of duty." Such action Jimmy had taken.

And now the last act of all. In the opening months of 1944 a new Force, a composite group of Mediterranean Allied Air Forces, came into being under the command of Air Vice-Marshal W. Elliott. It was known as the Balkan Air

Force and operated from bases in Southern Italy. Jimmy Powell found himself in command no longer of squadrons of his beloved Wellingtons but of Beaufighters destined to harrass a shaken but obstinate enemy holding out in the rugged mountains of Yugoslavia. By then he had contrived to fly a full tour of operations (thirty sorties) as a Group Captain. This, however, he considered was not enough. The pilots of his new command flew Beaufighters in daylight against such targets as enemy airfields situated in difficult, inhospitable country. True to his principles, Jimmy must discover all that could be known of the dangers and obstacles of such operations. On 18th August, 1944, flying with Flying Officer J. R. F. Reid, he set out to attack the German-held airfield of Banjaluka in Yugoslavia. All that happened on that last flight is not known, for the principal witness of it is also missing. Jimmy delivered his attack as usual from a low level, turned for home, and was almost immediately hit by anti-aircraft fire. His starboard engine was set ablaze and he was heard on the wireless telephone to say that he was about to make a forced landing. Others of the squadron flying with him saw the Beaufighter come in, touch down on what seemed a fairly open space, but it was on the side of a hill. The aircraft landed, moved a few yards and then burst into flames. Neither Jimmy nor his navigator were seen to leave it, and no authentic news of them or of the remains of their aircraft has been received.

So died John Alexander Powell in the performance of his duty, and more than his duty. To his wife, Mary Felicity Perpetua Ashworth, whom he married in 1935, to his son Jeremy and his daughter Jane, and to his friends, his loss is irreparable. But it is a personal sorrow to be borne with all the fortitude at their command, sustained and ennobled by memories which will be with them to the grave, To me these memories are especially vivid. With the eye of the mind I shall always, I hope, be able to see him at his desk in the Ops Room after a long night speaking, as was his habit, to each pilot and navigator as they came in from Kiel or Hamburg, Cologne or Berlin, Nuremberg, Munich, Genoa, Milan—all the places and many more which at one time or another he had attacked; or at the controls of a Wimpey rocking past Lincoln Cathedral lower than its towers towards a great patch of tulips which, some miles to the eastward, stained the fens with colour; or, beer mug in hand, explaining to Lord Trenchard the mystery of the black footprints on the ceiling of the mess at Feltwell; or helping a small boy of twelve, my son, into a parachute harness before sending him up for a flip in T for Tommy; or haranguing five thousand workers in an aircraft factory; or, most vivid of all, dancing a Russian dance with Sawrey Cookson to the melody of Eine Kleine Nachtmusik and Perpetuum Mobile.

To the Service in particular and to the Country in general, his death is most lamentable. Not yet forty years of age, the Royal Air Force can ill afford to be without officers so skilful and clear-thinking as was Jimmy Powell. It is pre-eminently the Service of the present and the future. As such, the heavy casualties sustained in the war which we have won at last, among men who, if they were still alive, would have formed the élite, not only of the Service but of the nation, may adversely affect its development and, therefore, the fortunes of England. That "it is upon the Navy under the good providence of God, that the wealth, safety and strength of the Kingdom do chiefly depend" can no longer be regarded as an axiom and may even be a snare and a delusion. Time will show. But what is quite certain is that an air force must for ever be clutching time by the forelock. To stand still is to drift backwards, for in times of peace the pressure of events only too often thrusts a nation in the wrong direction down the hill towards the enervating plain, not upwards to

the heights where the air is cold and clear.

It is upon men like Jimmy Powell, with his alert mind, his unshakeable spirit, his keen, untrammelled vision, that the burden should fall of maintaining, improving and defending against all comers a Service as vital to the safety of the country in the new world as was the Navy in the old. New ideas, new methods of transmuting them into action, a new spirit which will inform a new Service ready to deal with the old problems of war and peace in a new way—these are some of the essentials which the R.A.F. must possess if it is to fulfil the promise of its youth, magnificently apparent in the First German War, magnificently displayed in the Second. That is why the loss of a man like Jimmy Powell, even if it were unique—and, alas, it is not—is so grievous for a country which has fought for its existence twice in a generation and dare not risk a third conflict in any foreseeable future. That is why his life and his death, and the lives and deaths of all his comrades, whose sacrifice has given us victory, must inspire alike those who still live and those who are to come.

"Great men are meteors that consume themselves

To light the world."

Memoirs of an Early Flying Instructor

By Lieut. Commander (A) F. Warren Merriam, A.F.C., F.R.Ae.S. (Late R.A.F. and R.N.V.R.)

[EDITORIAL NOTE.—Many books dealing with the pioneer days of flying, the "Birth of Aviation," the "Conquest of the Air," and so on, have been written and each deals admirably with its own particular sphere. But in these pages the author tries to present a story so far untold—that of instruction in the earliest days and during the First Great War; rather as from the eyes of a father who has taught his children in the beginning, and has watched with pride, often awe, what his teaching has brought forth.

These reminiscences will be specially interesting to-day in view of the exact science to which instructing has now been brought, and of the truly amazing number of instructors and pupils who have been trained for this Second Great War. In those early days, one had to learn by hand and eye and ear, and almost wholly by experience. But now, flying instruction is a vast business, greatly simplified by instruments, perfectly reliable aircraft and a well-proved basic pattern.]

I.—THE CALL OF THE AIR

Y first effort to answer this call was when I successfully balanced myself on my father's penny-farthing bicycle at about the age of six; later, when I built and balanced on stilts over twelve feet high; and still later, when I climbed to the roof of a three-storey house by way of pipes and guttering, and had to be rescued by the fire brigade.

Balancing and height had always fascinated me, in spite of the fact that my eyesight was so bad that it necessitated operations and endless hospital treatment, with the resulting neglect of school work. I filled in much of my spare time practising balancing and juggling feats to such an extent that I was told by a

professional juggler to take up stage work. But wheels, they fascinated me, and I soon had my first motor-car, a 9 h.p. single-cylinder De Dion Bouton, which cost me £180, though when new two months previously, it had cost £400.

It will be difficult for the modern enthusiast to imagine the thrill of my first car, which I learnt to drive at the age of 21. It was wonderful. I caused a sensation wherever I went. People rushed out to see me pass and I was engaged to drive parties to various functions around the country. It could not mount much of a hill on front gear, so that on a steep hill I had to turn around and go up in reverse—as the reverse gear was lower. But in the case of a really steep hill, everyone had to get out and push!

The running expenses were high. I had to pay £9 for a Michelin outer cover, but the Hackney Carriage Licence cost only 15s. Number plates were not introduced until two years later. It was, in fact, not long after the days when a man with a red flag had to walk in front of

cars as a public warning.

I had learned my first real lesson on motors by taking the engine to pieces and re-assembling it, so that I soon became a De Dion expert. The result of this was that I was acknowledged by the manufacturers as a De Dion specialist, and they recommended me to the late Sir Reginald Cox of the old Cox's Army Agents. He engaged me to teach him to drive his De Dion and to drive him abroad for his health. Motorists in those days were submitted to a very severe road test in France and it was necessary to hold a certificate before being allowed to drive. There was no speed limit on the open country, only the limit of the motor itself. I was, however, summoned for exceeding the twelve miles limit through Fareham in this country.

An amusing incident occurred when I reached London. I was stranded in Buckingham Palace Road, close to the Palace, with engine trouble. It was impossible to work on it because so many curious onlookers had collected. seemed a hopeless position and was certainly no joke to be stranded under these circumstances when mechanics were so rare to help. There were no policemen about to control the crowd but I somehow managed to get the engine running, and by the simple expedient of shorting the ignition the people leaning against the car received such a shock that I was able to complete the adjustments! Of course, the cabmen took advantage of this temporary breakdown to vent their sarcasm and scepticism of motors in general, and mine in particular, by remarks such as "Where do yer 'orses come in now, guv'nor?"

I also enjoyed many thrills on one of the first Triumph motor-cycles and had valuable experience with most makes of cars, but my life was changed when that young cycle-repair expert, Orville Wright, of Dayton, Ohio, U.S.A., had the temerity to pull back the joystick of a home-made contraption and actually drive it two feet into the air. Motors suddenly seemed to become very ordinary and I saw a greater thrill ahead in flying.

Men in the city of New York had worked feverishly on cumbersome vehicles contrived of bamboo and silk to impress an earthbound populace of the worth of the needs of the

Wright brothers.

Men muttered amongst themselves, "How can a man attempt to fly when there's the slightest wind blowing?" When the flag hung limp they exclaimed, "Quick now, before it starts again!" Out came their awkward contraptions, and in mad bustle, wobbled along the ground, rose a foot or two, and settled some hundreds of yards away.

Demonstration followed demonstration of this kind. Men went mad. They cheered, danced and embraced each other, for they had flown

again and again. Just think of it!

The story of struggling aeronautics up to 1913 must read like a book of jokes these days. Surely no science has ever moved with such

rapid strides and achievements.

I responded to the call of the air in reality when the Wright brothers came over from America to fly at Le Mans, France, in December, 1908. Family reasons prevented me from taking an active part then, but I studied the theory of flight as much as any of us could in those days. My intense interest and admiration became focused on our earliest pioneers' flying activities and struggles. It is, therefore, with no small amount of pride that I look back now on that great day when I joined this happy band myself and came to know them intimately.

Before writing about my own entry into the field, I would like first to pay tribute and thanks to them by giving a brief account of their wonderful work for aviation in these early pages wherein they belong.

II.—THE EARLY PIONEERS

England owes much to the genius of Henry Farman for his construction of the Farman biplane, which proved so worthy a machine for school work. Most of our pilots prior to, and for nearly the first two years of the Great War, were taught and obtained their certificates on

Farman Box-Kites. Howard-Wright, Bristol, Vickers, Grahame-White and other biplane pushers, built on the same principle as the Farman, were also used. Henry Farman was an Englishman by birth but of French naturalization. He flew a circular course of one kilometre in his "Voisin" biplane in France on 13th January, 1908.

It was on this type of machine that Mr. J. T. C. Moore-Brabazon learned to fly, and by his example inspired several of our pioneers to

go to France and learn also.

In Fig. 1 we see the identical machine on which Moore-Brabazon learned to fly. It was called "Bird of Passage," and one could well say that it was an appropriate name because it was passed from one person to another who learned to fly it! It was powered by a "Vivinus" water-cooled engine. The total weight of the machine, including pilot, engine and radiator, was 1,150 lb.—very heavy, you will think, considering its low power, but this was no exception to the average weight of other aircraft of that period. The "Vivinus" engine was eventually replaced by an eight-cylinder E.N.V. motor.

After a deal of experience on this, Moore-Brabazon wished to obtain a British machine and so had one constructed by the Short brothers, fitted with a 60 h.p. water-cooled "Green" engine. Using this machine, he was granted the first Royal Aero Club Aviator's Certificate on 8th March, 1910, at Shellbeach, and we always refer to him as "Aviator No. 1." He had previously won the Daily Mail prize of £1,000 for the first mile ever flown on an all-British machine. By the way, his repair bills averaged about £300 per month—a great contribution to aviation from the private purse of a pioneer.

Adding to these distinctions, he won the first British Michelin Cup, awarded for flying a distance of eighteen miles. These do not appear remarkable feats at the present time, but in those days they were. They were the first step-

ping-stones to immense progress.

There has been some controversy over the question as to who was the first of two Englishmen to make an actual flight, Moore-Brabazon or A. V. Roe. The former's claim was, however, officially recognized by a Committee of Investigation set up by the Royal Aero Club, with Lord Gorell as chairman, assisted by Mr. H. E. Perrin, Secretary of the Royal Aero Club, Capt. G. de Havilland, and Mr. Lockwood Marsh.

A. V. Roe was among the first to start flying at Brooklands, and was one of the first to sample the joys of landing in the famous sewage farm adjacent to the areodrome. He was followed by many others, as mentioned elsewhere.

Fig. 2 shows him persevering on his triplane at Lea Marshes, in Essex, in 1909. On this flight he landed in the River Lea, which runs along-side the wall by the houses shown. This machine was called the "Yellow Peril" by his friends owing to the colour of the wings. His

workshop was in a railway arch.

A. V. Roe was often referred to then as "Roe the Hopper." Naturally, at that time, progress was only gained by "hopping" in the machines; and by this means, no doubt, he was the first to realize that, when taking off, the tail should be raised when gaining speed. Most pilots stalled with their tails on or near the ground and the nose of the machine up in the air, which resulted in crashes due to lack of air speed.

A. V. Roe built the first seaplane to rise from the water in Great Britain, and the first cabin machine in 1912. In 1913 he produced the famous Avro 504 type, an aeroplane which was built in larger quantities than any other, and became the standard training machine for the Royal Air Force at a later date. They were very easy to fly, but sufficiently sensitive on control to teach care, and that was why this particular type was known as the "Airman's Ideal."

Like most pioneers, "A. V." was often very short of funds, and there were great demands on his resources for repairs. To mention only one stroke of bad luck, when transporting two of his machines from his Manchester works to Blackpool for the meeting in 1910, the railway truck containing them caught fire. He and his brother, H. V. Roe, who was his partner, and the staff worked so hard that these were replaced in four days by new machines. "A. V." had three crashes on these!

Amongst the amusing incidents of those early days is one that I should like to tell before ending this short account of "A.V." It was during his experiments at Lea Marshes with his triplane that one day he received a visit from a lady who said she had heard of his experiments with enormous interest and wondered if he would permit her to fly the aeroplane. I suppose it looked so easy. He must have thought that she was either mad or very brave.

Fig. 3 illustrates the first Blackburn Monoplane in 1909. The photograph is autographed by Robert Blackburn, the designer. Like most of our successful pioneers, he was an engineer, and in company with them he became attracted to aviation first of all by attending flying meetings in France. In 1909 he designed, built and

flew his monoplane, which was fitted with a 35 h.p. "Green" Engine, with a chain-driven propeller. The machine was not very successful. However, it left the ground at the first attempt, but unfortunately sideslipped on the turn, crashed to the ground and was wrecked. Blackburn was not injured and the crash only spurred him to further efforts, for he carried on in his determined manner and actually built and flew an all-metal military monoplane, the first of its kind, which later led to the great success of the aircraft firm bearing his name.

I am reminded here of one of Mr. Blackburn's pupils, Mr. B. C. Hucks, a very brilliant stunt pilot who made the first crossing of the English Channel on a Blackburn monoplane, and, incidentally, was the first Englishman to

loop-the-loop.

Fig. 4 shows Colonel S. Franklin Cody, an Anglo-American who became a British subject. He was given the honorary rank by King George V. Clever and daring, Cody had a charming personality and was a star of many turns. In his early years he was attached to a "Wild West" cowboy troupe and to the melodrama stage, but this he gave up for kite-flying and conceived the idea of man-lifting kites.

One reads in the autobiography of Dr. Benjamin Franklin, the great American scientist and statesman, in his youth early in the 18th century, was one day flying his kite when he decided to have a swim in a nearby pond. So he tethered the kite to the ground and allowed it to remain flying in a powerful wind. Whilst in the water, however, it occurred to him to see if the kite would draw him along if he held the cable. He found that the kite would tow him.

Now Cody's idea was on a different scale, for he attempted to draw boats across the English Channel with his kite, with the result that the Army authorities were so convinced of the utility of his man-lifting kites that they awarded him £500.

Whilst employed by the War Office at Farnborough in the balloon Section of the Royal Engineers, Colonel Cody participated in designing and building our first dirigible. He constructed his first aeroplane in 1908, and in 1909 made a short flight. In this year, he also built another machine which held the world's record for a cross-country flight.

Besides winning several Michelin prizes, in 1912 he won the first prize of £4,000 on his big. biplane, illustrated in Fig. 4, in the Military Aeroplane Competition open to the world, and £1,000 for the best British aeroplane. It was called the "Cathedral" on account of its size,

the largest and heaviest machine of that day. Picture to yourself its colossal size (for those days). Its span was 46½ ft. with an 8 ft. gap between the planes, and it weighed 1,300 lb. without its pilot. It was constructed of bamboo poles, wire and fabric and was fitted with a 100 h.p. six-cylinder "Green" engine.

Cody knew very little about the theory of his work but this never seemed to worry him. It was his great courage in flying these contraptions which brought about his triumphs; and, I may say, little more than a fluke carried him so far, for these machines, as you may imagine, were terribly dangerous, being unsound in struc-

ture.

One day he wanted to test the strength of this machine and asked three or four of us to go up with him altogether. Three went, but I had made myself scarce at the time of the take-off, as I did not wish to offend Cody by a direct refusal! He declared that this machine was but a mosquito compared with the size of future aircraft. He had plenty of foresight and was going to build another machine much larger than this and he was sure that it would be effective. He did not live to fulfil this ambition, unfortunately, for he met his end not long after on this machine. His passenger was also killed, the machine having broken up in the air.

In Fig. 5, Mr. T. O. M. Sopwith is shown in his Howard-Wright biplane box-kite which was fitted with a 50 h.p. E.N.V. engine. It was the type on which the majority of us then learned to fly. Incidentally, on these box-kites, Sopwith taught to fly such famous men as Lord Trenchard, Air Chief Marshal Sir Edward L. Ellington, the late Harry Hawker and many others. He was an excellent pilot, steady and reliable. Outside the Bristol School of Flying he was really the only pilot at that time with whom I could trust myself and I must say I felt quite at ease when he took me up.

It was on the machine you see in this picture that Sopwith won the Baron de Forest prize of £4,000, which was offered to the man who flew the greatest distance from any point in England into the continent of Europe on an all-British aeroplane.

The story of this success, however, is a remarkable one. His engine had always given trouble, never running satisfactorily for more than ten minutes at a time—quite a hopeless predicament to be confronted with when starting on a big venture, and it looked as if he would have to back out. His engineer, Mr. F. Sigrist, saved the situation by locking himself up with the engine for a few hours and working a miracle on it, which subsequently brought

victory. It flew in three and a half hours to Belgium, a distance of about 177 miles, on 18th December, 1910, a wonderful show for that period.

In those days, undoubtedly the most conspicuous flying personality and national hero was Mr. Claude Grahame-White who, having been fired with enthusiasm by M. Blériot's flight across the Channel in July, 1909, commenced flying himself. He bought a Blériot monoplane which he had assisted to erect at Blériot's factory in France, where he gathered valuable knowledge and made trial flights at Issy-les-Moulineaux. Before acquiring Hendon aerodrome, where he opened his famous flying school, he had won many prizes and gold medals in this country and also in America, but not without involving himself in many crashes. But one may read in various books on aviation of all his magnificent work.

At Eastchurch, Mr. Francis McClean was deeply attached to flying, and as early as 1910 made a patriotic offer of the loan of his two Short machines to the Admiralty for instructing naval officers to fly. This offer was accepted, and thus the foundation stone of the Royal Naval Air Service was laid. The first four officers who learnt on these machines were Lieuts. R. Gregory, C. R. Samson and A. M. Longmore, of the Royal Navy, and Capt. E. L. Gerrard, R.M.L.I., under the instruction of Mr. G. B. Cockburn, who gave his services free for this purpose to the Admiralty.

III.—I LEARN TO FLY

I was an enthusiastic reader of Flight, commencing with its first issue in 1909, and by this means I eventually came into contact with the British and Colonial Aeroplane Company at Bristol. In 1911, I gave my engineering experiences to this company as an employee for five months, together with £50, in return for being taught to fly. Altogether, with living expenses, it cost me roughly £200 before I got any pay.

To obtain the Royal Aero Club Aviator's Certificate at the above school, apart from living expenses, etc., while learning to fly, cost over £100. Army and naval officers paid £75, which was refunded by the State to the officers if they were accepted in the Royal Flying Corps or Royal Naval Air Service afterwards. Nevertheless I, as a civilian, was well pleased with the terms I had come to with the Bristol company.

Mr. H. Delacombe, who was the manager of the company, eyed me in a very dubious and somewhat sympathetic way when I proferred my cheque for entry. He was reluctant to accept my £50 and reminded me of the risk I was running, both with my money and my neck. It was kindly advice and I was grateful to him for his sincerity; nevertheless, I was so enthusiastic that nothing would alter my mind.

According to public opinion in those days aviators were mad, and it was said of us that we were all suicidal. "Man was never meant to fly," they said, and so on! My own relatives and friends were dead against it also, so that when I started I had to keep my movements a secret. It was necessary for me to go under an assumed name and I adopted the name "Warren." Even at my age (29) I was not without domestic worry, for I was already a widower with three young children.

I worked very hard in the sheds with the mechanics all day and many times late into the night, learning all I could about Gnome and Anzani engines and helping with repairs.

Mr. Collyns Pizey, the chief instructor, took me for my first flight. Mr. H. Fleming was his assistant. Pizey died in Greece from natural causes whilst engaged in aviation with the Greek Government, and Fleming was killed flying at the beginning of the war.

My first taste of the air more than fulfilled my expectations. One could never be quite so cognisant of the wonders of aviation as when in actual flight, I found. I could best describe the sensation as that of being transferred from a badly sprung motor-car—bumpy roads admittedly—into a motor-boat. There is more buoyancy in the air than on the water, water being incompressible, but the "solidity" of the air impressed me. I lost that sense of nothingness or giddiness which I had hitherto experienced when looking down from some great height. This is found by most people who fly, but the explanation is outside the scope of this book.

How I marvelled at this great science which was to become such an important factor in the great scheme of life. This first impression was a delightful experience. The fascination of flying was incomparable. I, like many others, literally longed for the time when I should pilot a machine myself.

My tuition commenced right away, in conditions which would seem appalling to-day. The School machines were Bristol pusher biplanes, commonly called "box-kites," fitted with a 50 h.p. French Gnôme rotary engine between the main planes and the tail. They flew in still air at a speed of about thirty-six to thirty-eight miles per hour and carried nineteen gallons of petrol and nine of oil, sufficient for about three hours' flight. We used to boil sago to dope the wings, and this made the fabric as tight as a

drum over the structure. There were no safety straps, covering or other protection to offer any security to the pilot and passenger on these machines. All we could do was to hold on to the upright struts with one hand whilst the other hand was engaged on the joystick, and trust to Providence that we were not thrown out by any unusual or violent motion of the machine. There were no such luxuries as dual controls, instruments or earphones to facilitate instruction.

To make a good pilot, the pupil had need of a quick brain, for the only knowledge he gained whilst in the air was by his close observation of the pilot's actions and his own common

sense to grasp the meaning of them.

When the weather was calm—that is to say, when there was not enough wind to blow a feather—a pupil would be privileged to hold the joystick, which was a very awkward procedure, especially if he had short arms and body, for it was a good reach to lean over the instructor's shoulder in order to do this. The pilot, on landing, would explain to the pupil what he had been doing in the air. There would be a certain amount of taxi-ing on the ground from one end of the aerodrome to the other, switching the engine on and off. This practice was for keeping the machine straight by the rudder, and for getting the pupil accustomed to the pilot's seat. The necessary switching on and off business became a habit which played queer tricks at times when pupils were in the air alone, as it did on the occasion of my first straight flight.

Under these primitive conditions of tuition, pupils were eventually expected to qualify for

their Royal Aero Club Certificate.

It must be understood here that the qualified aviator at this date could himself only wallow about, as it were, practically new to the game, but endeavouring to instil his very limited knowledge into others. It was a case of the blind leading the blind. There was, therefore, a great element of danger attached to flying solo for the instructor, let alone his being encumbered by a pupil to take his attention away whilst in flight. Machines constantly broke in the air and the pilot was ever expectant of these mishaps. There were no wind tunnels in those days for testing the strength of wings or anything else, and there were, of course, no parachutes. There was, though, compensation for all these shortcomings in this delightful sport which attracted the very best types of men, as do all sports with an element of danger.

The delightful spirit of comradeship glowed; good fellowship simply radiated from all concerned at Brooklands at this period. Whenever

there was a bad smash or a less serious misfortune, everybody rallied from all the other rival sheds to assist and to offer genuine condolences. Failures happened frequently. The lending of tools, the exchanges of opinions and the desire to help others to the uttermost—all these personal contributions helped gallantly and materially to build up aviation. Those grand old days when we worked in perfect unity were too shortlived. All those who took part in them and were spared experienced a joy which was to be greatly distorted by antagonism in later activities, and as commercial rivalry increased.

I have very vivid impressions of our old school lorry loaded with a crowd of such comrades, perched on the bonnet and mudguards, hanging on anywhere, the whole outfit resembling a local fire-engine fully manned for operations, starting off to rescue some unfortunate being at the other end of the aerodrome.

But to get back to the story of my own course of flying tuition, the day came when Pizey told me it was time for me to make my first straight flight. The news travelled round the aerodrome, as it so quickly did when a pupil was to do his first solo attempt. Down went tools! Everybody turned out, mechanics as well, to watch the fun, or to assist with the wreckage, if so it should be! It was the usual thing for the observers to lie flat on the ground in order to ascertain to what height the machine rose. Pressmen were always on the spot on these great occasions.

I took off in good style, but the habit of switching on and off as already explained returned to me at a critical moment whilst in flight at about thirty feet up and it was only in the nick of time that I switched on again. The incident is best described in an extract from *The Aeroplane*:

"Warren (Meriam) also entered solo flying stage. At first attempt at landing switched off rather too soon, machine began to pancake, so with great presence of mind, switched on again and made an excellent landing."

So far so good, but I preferred to go gingerly at this important venture, step by step, each one thorough, and learning a great deal about the game by watching others making mistakes.

After considerable practice on "straights," I was to make my first circuit at a height of two or three hundred feet, but I only reached about forty! I had the "wind up"; not altogether afraid for my neck, but I knew that if I damaged the machine it might spoil my prospects with the firm as an instructor with them. I was

particularly anxious on this account because so many crashed on their first circuit.

It was the custom of dear old Pizey to hide in the "Blue Bird" restaurant, near the starting-point, while a pupil was doing his first circuit, and not show himself until somebody informed him that it was over! He could not bear to witness these ordeals. When I look back I do not wonder at it, as they were very nerveracking times for the instructor.

The usual aerodrome crowd had gathered when I took off safely, making sure not to switch off the engine this time. All went well, with the exception of one or two nasty air bumps which tilted the machine to a steep angle; but when coming down, I narrowly missed the "Blue Bird" restaurant and, skimming the chimney pots and roofs, finished up within an inch or so of some railings on the aerodrome. "Thank God I am on terra firma safely," I thought, "in spite of two near shaves." Pizey came running out to me, looking deathly pale, for I had given him a nasty turn when he heard the noise of the engine of the machine passing so close to the roof of the building. I apologized profusely for the fright I had given him. He sent me off again to make a better show, but, funnily enough, I seemed to be drawn to that spot, for again I circled practically over the same place and came down even nearer to the "Blue Bird" than before, and again all but touched the railings. I sat still, waiting and feeling too ashamed to face Pizey on account of what I knew he must be thinking of my two rotten attempts. He was mildly angry, but relieved to find that I was safe and that no damage had been done to the machine.

Pizey had wonderful control over his temper. I only remember him showing real anger once—an occasion which I will refer to later. He was patient and kind to all, and it was because of this delightful side of his character that one did one's utmost not to give him any anxiety during these tests.

After my first two feeble attempts, I am sure it was expected by everybody that my third would not fail to finish off the "Blue Bird, but Fleming took me up as a passenger to show me where to land, and my next effort turned out to be good enough. I was congratulated and praised by the instructors and, of course, was the envy of my fellow pupils who had not yet reached this happy stage. It was a wonderful feeling to have flown a circuit alone and landed safely, particularly when there were so very few pupils able to do so at that time.

After this, left- and right-hand turns, figures of eight and landings at a given spot kept me fully occupied. This was the final stage in order to qualify for the Royal Aero Club Aviator's Certificate, the tests for which were as follows:

A. Two distance flights, consisting of at least 3 miles 185 yards each in a closed circuit, the distance measured as described below.

B. One altitude flight consisting of a minimum height of 164 ft., which had not to form part of one of the two flights prescribed above.

1. The course on which the aviator accomplished the tests in A was marked out by two posts situated not more than 547 yards apart.

2. After each turn round one of the posts the aviator had to change the direction when going round the second post, so that the circuit would consist of an uninterrupted series of figures of

3. The distance flown had to be reckoned as

if in a straight line from post to post.

4. The method of alighting for each of the flights was to be with the motor stopped at or before the moment of touching the ground, and the aeroplane had to come to rest within a distance of 164 ft. from a point indicated previously by the candidate. The landing had to be effected under normal conditions, and the officials had to report the manner in which it was effected.

The first four men in England were granted their certificates in 1910, before any official rules were imposed. They were: Mr. J. T. C. Moore-Brabazon, Certificate No. 1; the Hon. C. S. Rolls, No. 2, Mr. A. Rawlinson, No. 3; and Mr. C. S. Grace, No. 4.

Following this it was necessary for candidates to pass the tests as set down by the Royal Aero Club. In accordance with progress these rules and tests were periodically adjusted and became more stringent.

The introduction of the French 50 h.p. Gnôme rotary engine had greatly facilitated flying owing to its higher power-for-weight ratio as against water-cooled engines with their necessary cooling apparatus. This eliminated much of the "grass rolling" which had to be carried out by other pilots whose machines were hampered by the extra weight of the stationary engines.

There were only four pupils granted certificates in that year, under the instruction of a French pilot, M. Edmond, namely, Messrs. J. F. Macdonald, S. E. Smith, A. R. Low and Capt. T. H. F. Wood.

About the middle of 1911, Mr. Howard Pixton, who had qualified for his certificate No. 50 on a Roe triplane on 24th January, 1911, joined the British and Colonial Aeroplane Company and took charge of the school until



FIG. 4
COLONEL CODY AND HIS "CATHEDRAL" AT BROOKLANDS IN 1912

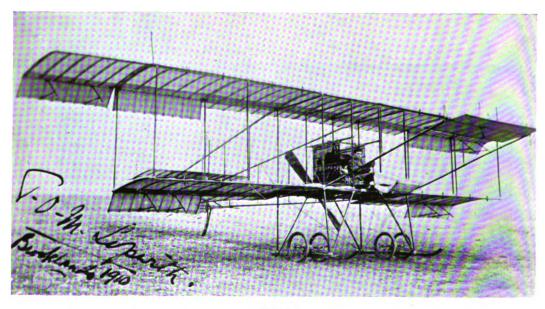
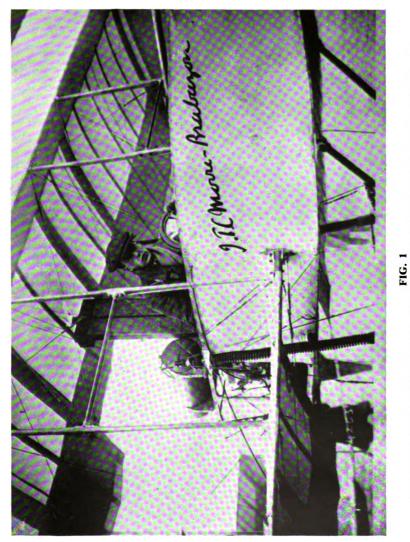


FIG. 5
T. O. M. SOPWITH SITTING IN HIS HAVARD-WRIGHT BIPLANE "BOX-KITE"



FIG. 6 A PHOTOGRAPH OF THE AUTHOR TAKEN IN 1911 ON A BRISTOL "BOX-KITE" POWERED BY A 50-H.P. GNOME ENGINE



THE VOISIN BIPLANE PUSHER "BOX-KITE," "BIRD OF PASSAGE," TAKEN ABOUT 1908, WITH MOORE-BRABAZON AT THE CONTROLS



FIG. 2 A. V. ROE FLYING AT LEA MARSHES, 1909, IN HIS TRIPLANE

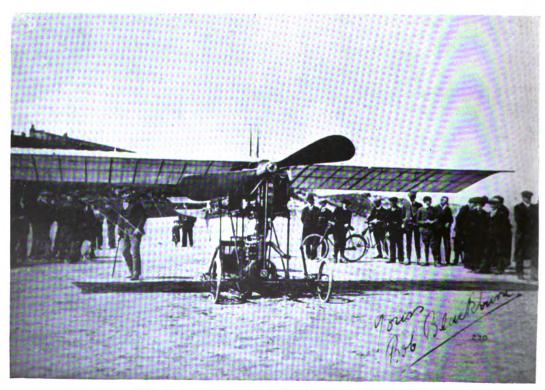


FIG. 3 THE FIRST BLACKBURN MONOPLANE, 1909

Messrs. Pizey and Fleming came on the scene

at the latter part of the same year.

It is interesting to note that just before I arrived at the Flying School, Pixton had just trained Major R. Brooke-Popham and the late General Sir David Henderson. The latter was the Director of Military Aeronautics, and Sir Robert Brooke-Popham ultimately reached the top of the ladder in the Royal Air Force.

Sixteen pupils passed for their brevets throughout the whole of 1911 at our school, including Capt. H. F. Wood's pupils, Archibald Knight, Harold Blackburn and Colonel Frederick Sykes. Roughly half dropped out of flying before the war broke out in 1914, and four at least were killed. Seven of them were my fellow pupils and were practically ready to pass out when I first commenced my training in October.

At the end of this year there remained a number, including myself, undergoing tuition, and eventually we all secured our aviators' certificates early in 1912, the first successful one being Mr. Tom Garne. I was the second, and the others following were Capt. T. Weeding, Lieut. S. C. Wingfield-Smith, Lieut. C. T. Carfrae, Capt. C. A. H. Longcroft, Major G. H. Raleigh, Capt. P. W. L. Broke-Smith, Lieut. J. W. Mackworth, Capt. H. C. Fielding, Major Sir A. Bannerman, Bart., Lieuts. G. S. Shephard and D. S. Lewis, and Mr. H. P. Nesham. Most of these received instruction from me before and after I took my own ticket, and with the exception of two or three they have disappeared from aviation.

Mr. Harold Lane, who was in the theatrical profession, was learning to fly, but could only manage to come for tuition at intervals. He used to write personal notes of his experiences with various aviators. Here is a passage from one of his write-ups which I choose to insert on account of the amusement it should afford the

modern pilot:

"I have been up as passenger with Mr. Merriam now on several occasions, the last one being the longest and lasting twenty minutes. There was a nasty cross-wind blowing at the time which did not improve matters, but the whole time he had the machine in perfect control and made it do just as he pleased. We were

up 1,500 ft. and were drifted out over Byfleet and once a nasty sustained gust caught our right wing and tilted us up at a pretty good angle for about half a minute, during which time I felt far from comfortable. But Merriam was not in the least perturbed. He put her straight nicely and got back into the aerodrome and started a volplane from the centre of the ground, which, owing to the wind, took us over the crowd at about 200 ft., where, switching on again, we circled the course and then came down. On another occasion, the engine stopped over the sewage farm. Merriam just put her nose down and started to volplane, when she picked up again.

"I must say, I feel just as confident up with Merriam as I do with either of my instructors. I think he is a good steady flyer and one who does not try any fancy tricks with the machine. I have seen him fly in some very nasty winds when only experts (and not many at that) dared

venture out."

My agreement with the firm, unlike the ordinary pupil, privileged me to take my time, and although I was quite ready to pass out, I preferred to wait for various reasons. This, of course, resulted in a later certificate number.

I eventually passed my test on 6th February, 1912, on a Bristol Biplane, Certificate No. 179, luckily without any damage to machines throughout my training. Elaborate celebrations took place when a pupil obtained his ticket. It was my turn now, having become a fully-fledged aviator, to stand drinks all round, and we finished up with a dinner and a cheery evening.

It seems a fitting time here to mention a few of the early Brooklands civil pilots, survivors of whom are still actively engaged in aviation, flying or otherwise. They were A. V. Roe, T. O. M. Sopwith, Gordon England, F. P. Raynham, R. Kemp, C. L. Pashley, N. S. Percival, H. A. Petre, S. V. Sippe, A. Knight, W. A. Sayers and W. O. Manning. Another pilot, F. E. T. Hewlett, was partly taught to fly by his mother, Mrs Maurice Hewlett, the first woman in this country to become a qualified aviator. Bunched together, these names present a fadeless picture in my mind, for it was amidst this happy little band of "birdmen" that I too started to flutter.

(To be continued.)

The Women's Auxiliary Air Force

THE Women's Auxiliary Air Force was formed in Great Britain by Royal Warrant on 28th June, 1939, to serve with the R.A.F. in time of war.

To-day, in 1945, the soundness of that decision has been completely demonstrated. In fact, the original estimate of women's capabilities to serve with the armed forces of the Crown, not only in trade qualifications but also in the ability to withstand physical strain, was far exceeded long before victory in Europe was achieved.

As a result, the percentage of W.A.A.F. substituting for R.A.F. personnel has far surpassed the original calculations. The 7,400 members enrolled by September, 1939, increased steadily, until in May, 1943, the total strength of the Service reached a figure of nearly 182,000 officers and airwomen. By the end of that year, 95 per cent. of the W.A.A.F. were directly substituting R.A.F. officers and men, while 70 per cent. of the airwomen were employed in skilled trades, many of which had previously been considered far beyond their capabilities.

W.A.A.F. SHARE IN R.A.F. OPERATIONS

Less than a year after the outbreak of war the Battle of Britain started in earnest. W.A.A.F. plotters, radar operators and telephonists displayed qualities of courage and discipline that evoked the admiration of many senior R.A.F. officers who had been doubtful whether women would remain calmly at their posts while the buildings in which they worked rocked under German bombing attacks. In-fact, the Group Captain of a Fighter Station who, in 1939, sincerely believed that war was not a job for women and that it should be left to their fathers, brothers and cousins to fill the fighting services, was converted into declaring: "I have cause to thank goodness that this country can produce such a race of women as the

W.A.A.F. on my station." The behaviour of W.A.A.F. detachments at radar stations had proved equally cool and steady. In November, 1939, the first twenty-six airwomen were selected for these duties and by the peak of hostilities in 1944 there were over 4,000 W.A.A.F. radar officers, operators and mechanics. They worked under the closest secrecy, frequently in considerable danger.

In July, 1941, there was a further development in the substitution of W.A.A.F. for R.A.F. personnel when the first W.A.A.F. Balloon Operators were formed into airwomen crews and took over sites in Sheffield, Portsmouth, Glasgow, Cardiff and London. As these original operators proved that women were equal to the duties, many more were trained until, at the peak period, 1,029 balloons were manned and handled by the W.A.A.F.

As the war progressed the W.A.A.F. played a noteworthy part before and during every important R.A.F. operation. The Dieppe raid, the North African landings, the great Bomber offensive on industrial targets in Germany and the occupied countries, D Day operations and the re-entry into Europe, the flying-bomb battle and final conquest of Germany, were all achieved with their help.

During the Dieppe raid, W.A.A.F. mechanics helped to refuel, rearm and repair aircraft in between the thousands of flights carried out on that momentous day. Plotters and radio operators, telephonists, transport drivers, parachute packers and cooks all accomplished herculean tasks. The cooks alone worked incessantly on 24-hour watches. Wrapped in blankets on the floor, they snatched an odd hour or two of sleep between the duties of preparing food for the air crews, operations staff and ground personnel.

The W.A.A.F. cooks who form 61 per cent. of the total number of cooks in the Royal Air Force, have worked long hours throughout the war on every kind of operational and non-

operational unit.

Before the North Africa landings W.A.A.F. provisioning clerks and equipment assistants at the R.A.F. Maintenance Unit at Stafford, prepared for despatch the major part of the R.A.F. equipment for the operation. For six months before D Day W.A.A.F. put in extremely long hours in parachute packing, covering the exercises which eventually made the air invasion of Normandy so successful. At one training unit alone three airwomen packed more than 24,000 parachutes, and over 90,000 practice descents made during seven months were accomplished without a single accident due to parachute failure.

One of the most important tasks that fell to the W.A.A.F. of Fighter Command in 1944 was the staffing of the Combined Control Signals Centre, through which were passed vital orders to front-line British and American fighter airfields, on which 2,000 front-line fighter aircraft were based for D Day operations. Airwomen formed 80 per cent. of the staff of this vital signals network.

The first British women to land on the Continent after the re-entry into Europe were three W.A.A.F. air ambulance orderlies who travelled to Normandy on D Day plus 7. They flew in Dakota aircraft; thousands of injured troops who had never before travelled by air were reassured by the presence of these young airwomen. Many of the orderlies have since made over forty operational trips in all kinds of weather, while some have been subjected to shell-fire when the airstrips at which they landed were near the front line.

However, they were by no means the first W.A.A.F. personnel to land on the Continent after 1940. At various times since June, 1943, several young W.A.A.F. officers parachuted into France to help organize the Resistance Movement and to act as couriers and wireless operators. They displayed remarkable qualities of tact, leadership and courage, and contributed greatly to the success of many supply-dropping operations and to the destruction of enemy forces.

Although W.A.A.F. personnel did not man the mobile balloon squadrons protecting London during the flying-bomb battle, they served at the Squadron Headquarters, cooked for the men, drove the vehicles which transported them to and from the sites, and received and despatched urgent signals while the new weapon roared overhead and frequently crashed round them. During the whole period they behaved with exemplary calmness and efficiency.

These are only a few examples of the part the W.A.A.F. have played in the defeat of Germany.

UNUSUAL OCCUPATIONS

Running through the list of jobs carried out by members of the W.A.A.F. one comes across some unusual occupations. There are the photographic interpretation officers who examine aerial pictures, who assess the importance of possible bomb targets or examine the damage resulting from previous bombing attacks. Then there are the psychologists who help in testing aircrew candidates and assess their capabilities, and orthoptists who help to improve the vision and visual judgment of pilots, and the model makers who helped to build the models used in training bomber crews for specific attacks such as those made on the Mohne and Eder Dams.

The first all-W.A.A.F. salvage team was formed in 1943. The airwomen tackled anything from a Tiger Moth or Spitfire to a Lancaster or Fortress, and on many occasions they dismantled enemy aircraft which crashed in

Great Britain. They carry out all sections of the work, except jacking the aircraft into a safe position and removing the guns, ammunition and unexploded bombs. Sometimes the crashed aircraft were Allied planes damaged on operations. These airwomen claim to be able to dismantle and load a wrecked Spitfire in one day. "But enemy bombers and our own fourengined ones take much longer," they say.

Another record set up by the W.A.A.F. is the staffing almost entirely by airwomen of an Equipment Park, with a W.A.A.F. Commanding Officer who holds the rank of Squadron Officer. These Parks are small units which hold stocks of aircraft and other equipment for rapid distribution to all airfields within a particular area. Stocks include such things as spare parts for airframes or engines, instruments, armament, photographic or radio equipment, dopes and paints. The unit works on a 24-hour basis, ensuring a rapid supply of everything that is demanded.

When W.A.A.F. officers were first introduced to the job of interrogating bomber crews, many people shook their heads. But the W.A.A.F. officers proved their worth, and until the defeat of Germany it was a common sight to see them carrying out interrogation in the early morning hours.

LIFE IN THE SERVICE AND THE DIFFICULTIES OF EXPANSION

It is well-known that the W.A.A.F. is an integral part of the R.A.F. Therefore, in 1940 and 1941, when rapid expansion of the Royal Air Force was essential, it was equally necessary for the sister Service.

The need for extra personnel was so urgent that recruiting was carried out with all possible speed. New units were being formed throughout the country, and as a result airwomen had frequently to be quartered in hastily equipped or inappropriate buildings. They suffered many discomforts caused by inadequate washing and sanitary arrangements, scarcity of barrack equipment and the unaccustomed lack of privacy that is unavoidable in the Service.

Additional hardship was caused by the fact that buildings at new bomber bases were dispersed as widely as possible in order that destruction in the event of enemy attack should be reduced to a minimum. On these stations the women had to walk or cycle as much as four miles to duty, frequently in bitter weather conditions. Their sleeping, recreational and mess quarters were all widely dispersed. The W.A.A.F. proved beyond all doubt that how-

ever hard they might find the life they could bear up as well as men under difficult living conditions which they had never previously been asked to experience.

Before the war there was no intention that W.A.A.F. officers should be given any duties except those of looking after the airwomen. However, as early as September, 1939, it was decided to employ them on code and cypher duties, and in March, 1940, the training of photographic interpretation officers began. Since then there has been steady substitution in a wide variety of branches, and by April, 1945, 4,500 W.A.A.F. officers out of a total of 6,077 had taken the place of R.A.F. officers. Since 1943, in addition to carrying out their technical duties they have assisted the Administrative officers in looking after the airwomen.

W.A.A.F. OVERSEAS

In January, 1944, it was decided that airwomen who volunteered should be drafted overseas. In June, 1941, the first W.A.A.F. code and cypher officers to go to an active theatre of war had proceeded to the Middle East. They were the advance guard of the 6,750 officers and airwomen who, in May, 1945, were serving in more than twenty-five territories from Canada and the United States to India, Ceylon and Australia, from Western Europe, including Denmark, Norway, Germany and Holland, to the lands of the Mediterranean and Middle East.

Local recruiting in the Middle East around a nucleus of officers and airwomen from Great Britain, has transformed the W.A.A.F. overseas into an international sisterhood. Writing from her station in the Middle East, an airwoman has said: "Apart from officers and

airwomen from home, from South Africa, Kenya, Tanganyika, Uganda and Rhodesia, there are representatives of all Allied nations and free peoples. Blondes are rare. The majority of 'us are plump, dark-eyed brunettes of five-feet nothing. There are Americans, Dutch girls, Belgians; there are girls from Malta, Cyprus and Greece—and an English girl brought up in China."

There has been no shortage of volunteers for overseas service. In 1944 the overseas tour of duty for W.A.A.F. was reduced from three to two years. In some cases, officers who had completed their tour have opted to remain on for a further twelve months while others returned to the United Kingdom, but again volunteered for overseas service after remaining at home for the compulsory six months.

CONCLUSION

During the war against Germany, 224,000—nearly a quarter of a million—women have served in the W.A.A.F.

During these years great strides have not only been made in the development of the Service, but also in the technical ability and character development of the airwomen themselves.

Nor has the effect of Service life detracted from their feminine qualities. They still find time to knit and execute delicate sewing, they take great pains in their appearance, and the attendance at classes organized for them under the R.A.F.-W.A.A.F. Education Scheme has shown that they are deeply interested in the domestic spheres of cookery, homecraft and mothercraft. With few exceptions they have enjoyed and appreciated their life in the Service, and they will leave it with an increased sense of self-respect and responsibility.

The Charter of the United Nations

A Commentary

N 26th June, 1945, the representatives of fifty nations, assembled at San Francisco, signed the Charter of the United Nations, which is to be the instrument for promoting peace and prosperity among the nations of the world in the future. Twenty-six years previously, in 1919, a similar event occurred: the signing of the Covenant of the League of Nations at Versailles. Circumstances too were similar. Germany had just been defeated in a war that had involved the whole world. History having

so far repeated itself, are we to assume that the cycle of events will continue as before and that the United Nations will fail as the League of Nations failed? There is no logical reason for assuming any such thing. In opposition to the popular idea that history always repeats itself, we have Lord Bryce's dictum: "History never repeats itself!" Lord Bryce was a great historian and "he should know."

The League of Nations had its successes. Among other things, it settled no less than

forty international disputes, any one of which might have blazed up into a war. But it was, on the whole, a failure. Not only did it fail to prevent the Japanese occupying Manchukuo in 1931 and the Italians invading Abyssinia in 1935: but when Hitler took his first overt actions in his attempt to gain the hegemony of Europe, when he marched his troops into the demilitarized Rhineland in 1936, when he seized Austria in March, 1938, and when he occupied Czechoslovakia in March, 1939, the League of Nations was already a thing of no account, a dead letter, and rightly though regrettably regarded as quite incapable of fulfilling the purpose for which it was brought into being. What chance then has the new Charter of succeeding where the old Covenant failed?

Though historical events may superficially appear to follow certain prescribed courses and cycles, a closer examination always reveals differences in detail and often fundamental differences in circumstances that appear to be the same. Here is the foundation for our hope that the United Nations and their Charter may prove to be a much more effective safeguard of peace than was the League of Nations and its Covenant. In the first place, the United Nations Charter was drawn up by men who had the experience of the League of Nations and its failure fresh in their minds. Though a negative advantage, this will at least have told them what to avoid. In the second place, the United Nations Charter is an improvement on the Covenant of the League of Nations in certain particulars of the greatest importance, notably in the matter of "Security." This, we shall notice, amongst other things, later. Meanwhile, in any examination or criticism of the United National Charter, it is essential to recognize and to remember what exactly that Charter is and also what it is not. The United Nations Charter is not, nor had its creators any hope of making it, an infallible preventive of war. No charter, no organization could be that. The United Nations Charter is merely a tool or instrument designed for the purpose of assisting in the peaceful solution of international disputes and for preventing the outbreak of wars both great and small, partly by removing the causes of war before they develop into hostilities and partly by threatening and, if need be, using armed force against a discontented and aggressive nation which will not listen to reason and prefers the battlefield to the council table. Being then a tool or an instrument, it must depend for its effectiveness upon the goodwill of those who use it. If all nations at all times wish to avoid war at all costs, then war will be avoided;

but if all are not so peaceably minded, then war may come and no charter that man could devise would prevent it.

That being so, is the nature of the instrument of little consequence? By no-means. It is of the greatest consequence. For upon the quality and efficiency of the instrument depends the quality and effectiveness of the work done. We may therefore examine the details of the United Nations Charter with profit, for upon these details, as well as upon the "will to peace" of the United Nations themselves, depends the future. While all the United Nations may now hate war and be determined to keep the peace, these happy circumstances can hardly be expected to continue indefinitely. Political, social and economic problems are sure to arise which will make some of the nations less averse to war than they are now. It is the function of the new Charter to provide the machinery whereby such problems may be solved by agreement between the parties before they reach that state of mind in which war seems preferable to concession. Only in the last resort, when peaceful persuasion has failed, is the use of armed force by the United Nations contemplated. Hence, the main function of the new organization is psychological—to maintain among all the nations of the world the "will to peace." In the light of these reflections we proceed to examine the details of the new Charter.

PROVISIONS OF THE CHARTER

The Charter is a document consisting of 111 Articles divided into nineteen chapters and containing about 10,000 words. The full text was printed in *The Times* of 27th June, 1945, occupying a little more than one complete page of that newspaper; and doubtless it will appear in due course in various other publications. Its phraseology is simple and clear, and everyone who is interested in this, the latest attempt to reduce the danger of war, is strongly recommended to read the original text in full and not to rely only upon extracts quoted in commentaries which, even with the best intentions, may produce erroneous impressions. For those, however, who have not immediate access to a copy of the Charter, we give here its Preamble in full and a summary of its main provisions before recording our criticisms and comments.

The PREAMBLE reads as follows: "We the peoples of the United Nations, determined to save succeeding generations from the scourge of war, which twice in our lifetime has brought untold sorrow to mankind, and to reaffirm faith in fundamental human rights, in the dignity and value of the human person, in the equal rights

of men and women and of nations large and small, and to establish conditions under which justice and respect for the obligations arising from treaties and other sources of international law can be maintained, and to promote social progress and better standards of life in larger freedom, and for these ends to practise tolerance and live together in peace with one another as good neighbours, and to unite our strength to maintain international peace and security, and by the accepting of principles and the institution of methods to insure that armed force shall not be used, save in the common interest, and by the employment of international machinery for the promotion of economic and social advancement of all peoples, have resolved to combine our efforts to accomplish these aims. Accordingly. our respective Governments, through representatives assembled in the City of San Francisco, who have exhibited their full powers found to be in good and due form, have agreed to the present Charter of the United Nations and do hereby establish an international organization to be known as the United Nations.

The Purposes of the United Nations (Chap. I. Art. 1) are: (1) To maintain international peace and security by collective measures for the prevention and removal of threats to the peace and for the suppression of acts of aggression, etc., and to bring about, by peaceful means and in conformity with the principles of justice and international law, adjustment or settlement of international disputes or situations which might lead to a breach of the peace; (2) all members shall fulfil in good faith their obligations as laid down in the Charter; (3) all members shall settle their international disputes by peaceful means; (4) all members shall refrain from the threat or use of force against any State in a manner inconsistent with the purposes of the United Nations; (5) all members shall support the United Nations in any action it takes in agreement with the Charter and refrain from helping its adversaries; (6) the organization shall ensure that non-member States do not jeopardize international peace and security by acting contrary to these principles; and (7) the United Nations shall not interfere with the domestic affairs of any State, except where the maintenance or restoration of peace demands such interference

MEMBERSHIP (Chap. II) is open to all the signatories of the Charter whose Governments ratify it and to all other nations who accept the Charter and are, in the judgment of the United Nations, able and willing to carry out its obligations. Any member against whom prevention

or enforcement action has been taken may be suspended; and any member who persistently violates the principles of the Charter may be expelled.

The Principal Organs of the United Nations (Chap. III) will be: a General Assembly, a Security Council, an Economic and Social Council, a Trusteeship Council, an International Court of Justice and a Secretariat. No restrictions are to be placed on the eligibility of men and women to participate, in any capacity and under equal conditions, in the principal and subsidiary organs of the United Nations.

The GENERAL ASSEMBLY (Chap. IV), which is to meet annually and at other times if necessary, will consist of all the members of the United Nations, each member being allowed not more than five representatives. It may discuss any matters within the scope of the Charter and, except when the Security Council is dealing with the matter in question, may make recommendations to members and to the Security Council. It may consider and make recommendations upon the principles of international cooperation for peace and security, and of the reduction and regulation of armaments. It may direct the attention of the Security Council to any circumstances that threaten international peace and security. The General Assembly is to initiate studies and make recommendations in the political, economic, social, cultural, educational and health fields, and to encourage the development of human rights and fundamental freedoms. It is to receive and consider annual and special reports from the Security Council and all other organs of the United Nations, and to review the budget of the organization and apportion expenses among the members.

Each member of the General Assembly is to have one vote. Decisions of the General Assembly on important questions are to be made by a two-thirds majority of the members present and voting. These questions include: (a) the maintenance of international peace and security; (b) the election of non-permanent members of the Security Council and members of the Economic and Social Council and of the Trusteeship Council; (c) the admission of new members to the United Nations; (d) the suspension and expulsion of members; (e) questions relating to the operation of the trusteeship system; and (f) budgetary questions. Decisions on all other questions are to be made by a simple majority of those present and voting.

The SECURITY COUNCIL (Chap. V), which is the core of the United Nations organization, will consist of eleven members: five permanent

and six non-permanent. The permanent members are to be China, France, the U.S.S.R., the U.K. and the U.S.A.; and the six non-permanent members are to be elected by the General Assembly for two years each. Each member of the Security Council will have one representative. The Security Council is to have primary responsibility for the maintenance of international peace and security in accordance with the purposes and principles of the United Nations and is to formulate plans for the regulation of armaments. Each member of the Security Council is to have one vote; and decisions on all matters, except procedural matters, are to be made by an affirmative vote of seven members including the concurring votes of all the permanent members. (This is the muchdiscussed "veto," by which any one of the "big five" can prevent a decision of the Security Council.) But when the question under discussion is one of the suspension or expulsion of members or of the making of regional agreements for the settling of local international disputes, an offending party or a party to a dispute is to abstain from voting. The Security Council is to function continuously. It may invite any State, whether a member of the United Nations or not, to participate, without vote, in its discussions for reasons of expediency or equity.

The Pacific Settlement of Disputes (Chap. VI): Disputing parties are to seek a solution first by negotiation, enquiry, mediation, conciliation, arbitration, judicial settlement, resort to regional arrangements or other peaceful means; and the Security Council may call upon them to do so. The Security Council may investigate any dispute likely to endanger the peace of the world and may recommend appropriate procedures or methods of adjustment. Any nation, whether a member of the United Nations or not, may bring a dispute before the Security Council or the General Assembly; but non-members so doing must accept in advance, and for the purpose of the dispute, the obligations of the Charter regarding pacific settlement. Parties to a dispute who fail to settle it by peaceful means among themselves are to refer it to the Security Council which, if the dispute endangers the peace of the world, may take any action it considers necessary to preserve peace, or, if all the parties are willing, it may make recommendations favourable to a peaceful solution.

The Security Council is to determine the existence of any Threat to the Peace, Breach OF the Peace or Act of Aggression (Chap. VII) and make recommendations or decide what measures shall be taken to maintain or

restore international peace and security. To prevent an aggravation of the situation, the Security Council may call upon the parties concerned to comply with such provisional measures as it deems necessary or desirable without prejudice to the rights, claims or position of the parties concerned. The Security Council may decide what measures *not* involving the use of armed force are to be employed to give effect to its decisions and may call on the members of the United Nations to apply such measures. These may include complete or partial interruption of economic relations and of rail, sea, air, postal, telegraphic, radio and other means of communication and the severance of diplomatic relations.

If these be inadequate, it may take such action by air, sea or land forces as may be necessary to maintain or restore international peace and security. All members of the United Nations undertake to make available to the Security Council, at its call, the necessary armed forces, assistance, facilities, rights of passage, etc., in accordance with agreements which are to be negotiated as soon as possible between individual members and the Security Council. National air-force contingents are to be held immediately available by members for combined international enforcement action under the Security Council. A 'Military Staff Committee, consisting of the Chiefs of Staff of the permanent members of the Security Council, is to advise on military requirements. The Military Staff Committee will be respensible, under the Security Council, for the strategic direction of any armed forces placed at the disposal of the Security Council. Questions relating to the command of such forces are to be determined later. Nothing in this Charter impairs the inherent right of individual or collective selfdefence if an armed attack occurs against a member of the United Nations, until the Security Council has taken the measures necessary to maintain international peace and security.

N.B.—The text of this important chapter dealing with the employment of international armed forces is reprinted in full, with notes and comments, elsewhere in this number of THE ROYAL AIR FORCE QUARTERLY.

REGIONAL ARRANGEMENTS (Chap. VIII) are not precluded provided they are consistent with the purposes and principles of the United Nations. The Security Council is to encourage the pacific settlement of local disputes through regional arrangements and also to utilize such regional arrangements for enforcement action.

INTERNATIONAL ECONOMIC AND SOCIAL CO-

OPERATION (Chap IX) for the creation and development of conditions of stability and wellbeing, which are necessary for peaceful and friendly relations among nations, is also provided for. The United Nations are to promote: (a) Higher standards of living, full employment, and conditions of economic and social progress and development; (b) solutions of international economic, social, health and related problems; (c) international cultural and educational cooperation; and (d) universal respect for, and observance of, human rights and fundamental freedoms for all without distinction as to race, language or religion. The various specialized agencies established by international agreement and having wide responsibilities are to be brought into relationship with the United Nations.

The ECONOMIC AND SOCIAL COUNCIL (Chap. X) is the organ responsible, under the General Assembly, for carrying out the duties set out in the preceding chapter (Chap. IX); and it is to co-operate with the specialized agencies mentioned therein. It will consist of eighteen members, to be elected by the General Assembly annually in groups of six for three years. Each member is to have one vote, and decisions are to be made by a majority of the members present and voting.

A DECLARATION REGARDING NON-SELF-GOV-ERNING TERRITORIES (Chap. XI).—Members of the United Nations, which have or assume responsibilities for the administration of territories whose peoples have not yet attained a full measure of self-government, recognize the principle that the interests of the inhabitants of these territories are paramount, and accept as a sacred trust the obligation to promote to the utmost, in accordance with the principles of the Charter, the well-being of the inhabitants of these territories, to promote their political, economic, social and educational advancement and their just treatment and protection and to develop self-government by the encouragement of free political institutions appropriate to their circumstances. But in applying these principles, account must also be taken of the social, economic and commercial interests of the rest of the world.

An International Trusteeship System (Chap. XII) is to be established by the United Nations for the administration and supervision of these territories, which will be known as Trust Territories. The Trusteeship System is to apply to (a) territories now held under mandate; (b) territories detached from enemy States as a result of the Second World War, and (c) territories voluntarily placed under the system

by States responsible for their administration. All members of the United Nations and their nationals are to receive within Trust Territories equal treatment in social, economic and commercial matters and the administration of justice; but the well-being of the native inhabitants is always to be the paramount consideration. It is to be the duty of the Administering Authority to ensure that the Trust Territory shall play its part in the maintenance of international peace and security. To this end the Administering Authority may make use of volunteer forces, facilities and assistance from the Trust Territory in carrying out the obligations towards the Security Council undertaken by the Administering Authority as well as for local defence and the maintenance of law and order within the Trust Territory.

The Trusteeship Council (Chap. XIII) will consist of (a) all members of the United Nations which are administering Trust Territories; (b) all permanent members of the Security Council which are not administering Trust Territories, and (c) as many more (to be elected periodically by the General Assembly) as may be necessary to ensure that the total number of members of the Trusteeship Council is equally divided between those members of the United Nations which administer Trust Territories and those which do not. Each member will have one representative and one vote. Decisions are to be taken by a majority of those present and voting. The Trusteeship Council is to avail itself of the assistance of the Economic and Social Council.

The International Court of Justice (Chap. XIV) will be the principal judicial organ of the United Nations. Each member of the United Nations is to comply with the decision of the International Court of Justice in any case to which it is a party. If any party fails to perform its obligations under a judgment of the Court, the other party may have recourse to the Security Council. This may make recommendations or decide upon measures to be taken to give effect to the judgment. Members are, however, free to refer their disputes to other tribunals. The General Assembly and the Security Counicl may request the International Court of Justice to give an advisory opinion on any legal question.

The Secretary General with the necessary staff. The Secretary General is to be appointed by the General Assembly on the recommendation of the Security Concil. He will be the chief administrative officer of the organization. He is to act in that capacity in all meetings of the

General Assembly, the Security Council, the Economic and Social Council and the Trusteeship Council, to perform other functions entrusted to him by these organs, and to make an annual report to the General Assembly. He may bring to the attention of the Security Council any matter which, in his opinion, may threaten the maintenance of international peace and security. The Staff is to be appointed by the Secretary General so as to secure the highest standard of efficiency, competence and integrity, due regard being paid to the importance of recruiting the staff on as wide a geographical basis as possible.

In the performance of their duties, the Secretary General and the Staff will not seek or receive instructions from any Government or from any other authority outside the organization. They will refrain from any action which might reflect on their position as international officials who are responsible only to the organization. Each member of the United Nations undertakes to respect the exclusively international character of the responsibilities of the Secretary General and the Staff and not to seek to influence them in the discharge of their responsibilities.

MISCELLANEOUS PROVISIONS (Chap. XVI).—
(a) All future international treaties and agreements are to be registered with the Secretariat of the United Nations; (b) a member's loyalty to the United Nations and its Charter is to take precedence over its loyalty to any other interest or obligation; (c) the organization is to enjoy the necessary legal capacity in the territories of all its members; (d) the organization, its members and their representatives, and its officials are to enjoy such privileges and immunities as are necessary for the independent exercise of their proper functions.

During the Transition Period (Chap. XVII) until the arrangements are completed and carried out for placing armed forces at the disposal of the Security Council, the five permanent members of the Security Council and others are to determine upon, and co-operate in, any action necessary to the maintenance or restoration of international peace and security. Nothing in the Charter is to invalidate or preclude action, in relation to any State which, during the Second World War, has been an enemy of any signatory to the Charter, taken or authorized as a result of that war by the responsible governments.

AMENDMENTS TO THE CHARTER (Chap. XVIII) are to come into force when adopted by a vote of two-thirds of the members of the General Assembly and constitutionally ratified

by two-thirds of the members of the United Nations including all the permanent members of the Security Council (the veto again). A general conference of the members of the United Nations for the purpose of reviewing the present Charter may be held at a date and place to be fixed by a two-thirds vote of the General Assembly and by a vote of any seven members of the Security Council. If such a conference has not been held before the tenth annual session of the General Assembly, the proposal to call such a conference is to be placed on the Agenda of that session of the General Assembly and the conference is to be held if so decided by a majority vote of the members of the General Assembly and by a vote of any seven members of the Security Council.

RATIFICATION, AUTHENTICITY, ETC. (Chap. XIX).—The Charter is to be ratified by the signatory States in accordance with their respective constitutional processes. It is to come into force when ratifications have been deposited by the five major powers (China, France, the U.S.S.R., the U.K. and the U.S.A.) and a majority of the other signatory States. Charter, of which the Chinese, English, French, Russian and Spanish texts are equally authentic, is to remain deposited in the archives of the United States of America. Duly certified copies are to be transmitted by the Government of the U.S.A. to the Governments of the other signatory States. The Charter is signed and dated at San Francisco the twenty-sixth day of June, one thousand nine hundred and fortyfive.

Criticism and Comments

Criticism of the United Nations Charter naturally begins by comparing it with the Covenant of the League of Nations. The question whether the new Charter is better than the old Covenant is debatable and can only be decided by the course of future events.

It is a healthy sign that the public appears to expect less of the United Nations than it did of the League of Nations. This League was at first regarded by many as a certain guarantee of peace; and its failure to justify such sanguine expectations suggests that, in the present state of international relationships, no association of sovereign states, however perfect its charter or covenant, can offer any such guarantee. The general attitude of the public is therefore more critical and more realistic. They realize now, as perhaps they did not in 1919, that peace depends on the goodwill of the Powers and especially of the Great Powers. It is therefore one of the more important tasks of the United Nations to cultivate goodwill among the

nations of the world and to promote and maintain friendly relations between them. Upon its ability to do this the new organization will be judged.

The United Nations organization has obvious advantages over its forerunner, the League of Nations. It is already assured of the support, from the start, of the U.S.A. and the U.S.S.R., the two greatest powers in the world to-day. It is provided with a Security Council in continuous session, authorized to investigate any dispute and able to command armed forces to impose its will upon recalcitrant nations. In 1919 the mistakes were made of giving too big a role to the small nations and of over-estimating the pacifying effect of economic sanctions. In 1945, these mistakes have been largely avoided. The Great Powers dominate the Security Council, whose influence promises to be much greater than that of the Council of the League of Nations, and the rule of unanimity, which so seriously handicapped the Assembly and Council of the League, is gone. And while economic sanctions may still be applied at the discretion of the Security Council, they can now be backed up by the threat and application of armed force. Furthermore, the new Charter, recognizing the fact that ambition, economic rivalry and social and political injustice are fruitful causes of war, provides a special organ, the Economic and Social Council, to study these matters and to encourage and co-ordinate all efforts to reduce them. Another important advantage is that the Charter offers no assurance of the territorial integrity of existing States as did the Covenant. This is a great improvement. If international justice and the peace of the world demand rectification or modification of frontiers, then such alterations can be made in conformity with the purposes and principles of the United Nations.

It has been said that the new Charter is less perfect than the old Covenant but more practical. This may well be, for in striving after the ideal we often lose sight of the real. The architects of the Charter at Dumbarton Oaks and San Francisco appear to have avoided this pitfall. Let us consider some of the Charter's alleged imperfections. The Security Council is to dispose of armed forces and military facilities provided by the members in accordance with individual agreements to be made between it and them. It will take some time and no little trouble to complete and ratify fifty or more such agreements. And this task, which may well prove far more difficult than the preparation of the Charter itself, has been criticised as out of all proportion to the magnitude of

the tasks which these "police" forces will have to do. For, as we have seen, the United Nations as an organization cannot take action against any one of the five Great Powers. So concerted action can be taken only against one of the middle-sized or smaller powers or against one or more of the disarmed and demilitarized enemy States of the Second World War. Denys Smith, a Daily Telegraph Special Correspondent, says that the assembling of this "elaborate machinery is a little like building a steamroller to crush a dispute between rival colonies of ants." Yet all this machinery need not be used at once; doubtless the forces most conveniently situated for dealing with a local disturbance would suffice. Moreover, the mere threat of such overwhelming force might well be effective without firing a single shot or dropping a single bomb. One great weakness of the League of Nations was its total inability to apply military sanctions. Are we then to quarrel with the new Charter because it provides the United Nations with a force that seems unnecessarily large? Furthermore, every nation will want some sort of a fighting force of its own. If each nation's quota is fixed by agreement with the Security Council of the United Nations, that may provide a proportional basis for progressive disarmament in the future.

The new Charter does not provide collective security against all nations, great and small. It was generally recognized at San Francisco that if one of the Great Powers is determined to go to war, nothing can prevent another world war. Such circumstances are admittedly outside the scope of the present Charter. On the other hand it is the allied Great Powers alone that can ensure the future peace of the world by agreement among themselves, based on the fundamental principles of the Charter, and by "policing" other nations, with help from some of the others. For the experience of this war and the last shows that the hard core of any international force must be the contingents of one or more of the Great Powers. And that is one answer to the complaints of the smaller powers. that the Security Council is dominated by the "big five." The influence of any nation in the Council ought surely to be in proportion to its fighting strength, because, whether you like it or not, that is the most decisive factor in the present state of the world. The "big battalions" still decide the fate of nations. It may also be pointed out that the Security Council can make no decision without the agreement of at least, two of the medium or smaller powers. (Seven ayes" are necessary, including those of the

"big five" and two others.) And again, the veto of the Great Powers, which is the price of their support of the United Nations (and without any one of them the Charter cannot come into force), applies only to decisions and cannot be used to prevent free discussion in the Council of any matter, even if that matter vitally affects one or more of the Great Powers. This concession, rightly given to the smaller powers, is all they can expect.

So much for the alleged weaknesses of the Charter as it stands. And now what are the dangers to its future operation? The medium and small powers may attempt to gain greater influence. As it is, they can carry important decisions in the General Assembly by a twothirds majority of themselves against the wishes of any or all of the Great Powers, and in the Economic and Social Council by a simple majority; though how they could get their decisions implemented without the support of the Great Powers is not clear. Another possible danger to the success of the Charter has been pointed out by "Scrutator" of the Sunday Times. Because this concerns the policies of the Dominions, we express no opinion upon it, but merely quote "Scrutator's" own words. He wrote: "It was disappointing to see the British Dominions supporting it (i.e., the aspiration of the non-great Powers to a bigger voice in policy than their strength warrants). They (the Dominions) can play either or both of two parts in the world-organization. They can act as small nations, in which case their influence must remain minor, or they can act as components of the British Empire, in which case it can be major, and their contribution may even be an indispensable one, or if the United States and Russia are to have a third Power of comparable scale standing by their side (and it seems most important for the future of their co-operation and the world's peace that they should), that Power can only be the British Empire, not Great Britain alone. And within it the Dominions of the Commonwealth ought to take a full share on a regularized basis. It will be a great loss to the world if particularism prevents this,"

President Truman, in his farewell speech to the members of the San Francisco Conference, warned them of the dangers to be expected from outside. He said: "The forces of reaction and tyranny all over the world will try to keep the United Nations from remaining united. Even while the military machine of the Axis was being destroyed in Europe—even down to its very end—they still tried to divide us. They failed, but they will try again. They

are trying even now. To divide and conquer was, and still is, their plan. They still try to make one ally suspect the other, desert the other. But I know I speak for every one of you when I say that the United Nations will remain united. They will not be divided by propaganda either before the Japanese surrender or after." With this warning we heartily agree, and we can only hope that his prophecy will be fulfilled.

Our attention has also been drawn to the possibility that the "new diplomacy" may tend to supplant the old. The League of Nations is alleged to have cut the ground from under the feet of ambassadors and ministers plenipotentiary. If it did so it was a pity, and we trust the United Nations will avoid this indiscretion. The older diplomacy has centuries of tradition and experience behind it, and though often at fault, has performed a most difficult function with credit to itself and advantage to the governments it serves. Such new things as the League of Nations and the United Nations, being yet in the experimental stage, cannot supersede the older diplomacy. But they can supplement its efforts, and should be regarded as supplementary means for the settlement of disputes, to collaborate with the diplomatic service and not to usurp its functions.

If the greatest failure of the League of Nations was its failure to prevent the Second World War, what prospects have the United Nations of preventing a third? That depends We have upon who may be the aggressor. already seen that the security machinery provided by the new Charter could not operate if one of the permanent members of the Security Council was determined to put its claims to the arbitrament of war. So even if the Charter had been in existence instead of the Covenant in 1931 and 1935, it could not have operated to prevent Japan's occupation of Manchuria or Italy's invasion of Abyssinia, because Japan and Italy were both Great Powers and members of the Council at those times. But the principal aggressor in the Second World War was Germany, not then a member of the League of Nations. If the Charter had been in operation at that time, the whole security machinery therein proposed could have been brought to bear against Germany's threats and actions in 1938 and 1939. Now it is a tenable hypothesis that Germany and Japan, and perhaps Italy as well, may try, some years hence, to recover something of what they have lost in the Second World War. Unless they become in the meantime members of the United Nations and permanent members of the Security Council, the whole machinery of the United Nations would be available to deal with the situation. And outside the five permanent members of the Security Council already nominated, there is no State, except these three, capable of causing a major war.

One of the greatest merits of the new Charter, as compared with the Covenant, is its realism. The authors of the Covenant appeared to think that all the nations were really lovers of peace and anxious to maintain peace at some cost to themselves. The authors of the Charter knew this to be a fallacy. Nation states are ambitious, proud, jealous, greedy and quarrelsome, and this is always true of some and sometimes true of all. Accordingly, the United Nations Charter places armed force at the disposal of the peace-loving nations wherewith to quell the bellicose. It has been wisely said: fear war too much is to encourage the bellicose." The United Nations do not fear war; they hate it.

The Charter has yet to be ratified by all the signatory States except the U.S.A. It will not come into force until constitutionally ratified by each of the "big five" and a majority of the other signatories. Will it come into force? The answer appears to be yes, almost certainly. There can surely be no doubt about our ratification, since the British nation has played one of the principal parts in creating it. The Senate of the U.S.A. ratified it on 28th July, 1945, by an overwhelming majority of 89 to 2. The U.S.S.R. is unlikely to refuse, since every important provision was referred to Moscow and approved there before the Russian delegation would allow it to be included in the Charter. Nor is there any reason to expect objections from the Governments of France and China. And it is hard to imagine any large number of the medium and small powers refusing to ratify since they have everything to gain and nothing to lose by ratifying. So we may safely assume that the Charter will come into operation.

One word of warning may be permitted before we close. The word "freedom" is on everyone's lips, but we must be sure that we do not mistake freedom for licence. Among individuals living a social life, there can be no absolute freedom, for the freedom of one would curtail the freedom of others. Similarly among nations living in a world such as this there can be no absolute freedom, and the sovereignty, upon which each nation prides itself and of which it is rightly jealous, must not be so jealously guarded as to endanger the sovereignty of others or to imperil its own existence as a nation. When a war breaks out, who can tell what degree of sovereignty will remain to the loser? In ratifying the Charter of the United Nations, every member nation will sacrifice a little of its sovereignty by undertaking to abide by and to support the decisions of the whole. The League of Nations did good work when its members were ready to merge their sovereignties in a common effort, but when the nations jealously guarded their own individual rights, league forms were unavailing. So it will be with the United Nations.

Notes and Comments on the Military Provisions (Chapter VII)

Chapter heading and Art. 39.—The action contemplated in this Chapter is only to be taken in circumstances indicated by the chapter heading, i.e., when the peace is threatened or broken or when acts of aggression are being, or about to be, taken. And it is important to remember, when considering this Chapter, that the object of the Security Council, and of any action it may take under these Articles, is the restoration of international peace and security and not the redress of grievances, provision for which is made elsewhere.

Art. 40.—"Provisional measures" may include temporary concessions by one or both parties to a dispute, or complete or partial demobilization, or the withdrawal of armed forces from frontiers or from territory the possession of which is in dispute, etc. Such provisional measures are not to prejudice the later settlement of the dispute, but refusal to comply may affect the ultimate award.

Art. 41.—The first measures to be taken to bring a recalcitrant nation or nations to a more peaceable frame of mind are to be economic sanctions and the severance of communications and of diplomatic relations.

Art. 42.—Only when attempts at "peaceful persuasion" fail, may the Security Council apply armed force by way of sanctions; and then the Article implies that "demonstrations and blockade" may be sufficient without any more lethal action.

Art. 43.—The contribution of each member to this international force is to be determined by agreement between itself and the Security Council, and the agreement must be constitutionally ratified by the member's own government. These agreements are to be "negotiated as soon as possible" so as to be ready for application without delay when occasion arises. Some protest has already been made in the Senate of the U.S.A. about this slight surrender of absolute sovereign control over the

nation's own armed forces and over its foreign policy; and the question has also been raised in the same quarter, whether the President or Congress may constitutionally ratify such agreements. It is not unlikely that other nations may show reluctance in ratifying these agreements.

Art. 44.—A just and graceful provision recognizing the interests of a nation which supplies a contingent to the "international force." Note that it invites "participation in the decisions" but gives no power of "veto." So a smaller power's contingent could apparently be employed, although that power objected to the object or manner of its employment. It could, of course, withdraw its contingent, but in doing so it would presumably risk suspension or expulsion from the United Nations.

Art. 45.—The importance and implication of this clause needs no emphasis. The words "immediately available" are to be taken literally and may be stressed. Prompt air action may well be decisive before sea and land forces are

brought into operation.

Art. 46.

Art. 47.—It is a matter for congratulation that the Military Staff Committee is to be kept within reasonable limits and to consist of those most competent to fulfil its functions. The longcanvassed difficulties of making an efficient army out of contingents from different nations need no longer cause dismay after the success of Field-Marshal Alexander's 8th Army in Italy, and the question of supreme command had already been satisfactorily solved in the later stages of the First World War (1914-18) and throughout the Second World War (1939-

Art. 48.—To this extent must members of the United Nations give up a portion of their sovereignty. Para. 2 refers also to the application of peaceful sanctions.

Art. 49.

Art. 50.

Art 51.—This is a very necessary provision. It seems to intend that, as soon as "collective action comes into operation" under the Security Council, individual or group action in selfdefence must be merged into collective action for the restoration of peace.

FULL TEXT OF THE CHARTER OF THE UNITED NATIONS

We the peoples of the United Nations, determined to save succeeding generations from the scourge of war, which twice in our lifetime has brought untold sorrow to mankind, and

to reaffirm faith in fundamental human rights, in the dignity and value of the human person, in the equal rights of men and women and of nations large and small, and

to establish conditions under which justice and respect for the obligations arising from treaties and other sources of international law can be maintained,

to promote social progress and better standards of life in larger freedom,

and for these ends

to practise tolerance and live together in peace with one another as good neighbours, and

to unite our strength to maintain international

peace and security, and

by the accepting of principles and the institution of methods to insure that armed force shall not be used, save in the common interest, and .

by the employment of international machinery for the promotion of economic and social advancement of all peoples have resolved to combine our efforts

to accomplish these aims.

Accordingly, our respective Governments, through representatives assembled in the City of San Francisco, who have exhibited their full powers found to be in good and due form, have agreed to the present charter of the United Nations and do hereby establish an international organization to be known as the United Nations.

CHAPTER I.—PURPOSES AND PRINCIPLES

Article 1

The purposes of the United Nations are:

1. To maintain international peace and security, and to that end: to take effective collective measures for the prevention and removal of threats to the peace and for the suppression of acts of aggression or other breaches of the peace, and to bring about by peaceful means, and in conformity with the principles of justice and international law, adjustment or settlement of international disputes or situations which might lead to a breach of the peace;

2. To develop friendly relations among nations based on respect for the principle of equal rights and self-determination of peoples, and to take other appropriate measures to strengthen universal peace;

3. To achieve international co-operation in solving international problems of an economic, social, cultural, or humanitarian character, and in promoting and encouraging respect for human rights and for fundamental freedoms for all without distinction as to race, sex, language, or religion; and

4. To be a centre for harmonizing the actions of nations in the attainment of these common ends.

Article 2

The organization and its members, in pursuit of the purposes stated in Article 1, shall act in accordance with the following principles:

1. The organization is based on the principle of

the sovereign equality of all its members

2. All members, in order to ensure to all of them the rights and benefits resulting from membership, shall fulfil in good faith the obligations assumed by

3. All members shall settle their international disthem in accordance with the present Charter. putes by peaceful means in such a manner that in-ternational peace and security, and justice, are not endangered.

4. All members shall refrain in their international

relations from the threat or use of force against the territorial integrity or political independence of any State, or in any other manner inconsistent with the purposes of the United Nations.

5. All members shall give the United Nations every assistance in any action it takes in accordance with the present Charter, and shall refrain from giving assistance to any State against which the United Nations is taking preventive or enforcement action.

6. The organization shall ensure that States which are not members of the United Nations act in accordance with these principles so far as may be necessary for the maintenance of international peace and

7. Nothing contained in the present Charter shall authorize the United Nations to intervene in matters which are essentially within the domestic jurisdiction of any State or shall require the members to submit such matters to settlement under the present Charter; but this principle shall not prejudice the application of enforcement measures under Chapter VII.

CHAPTER II.—MEMBERSHIP

Article 3

The original members of the United Nations shall be the States which, having participated in the United Nations Conference on International Organization at San Francisco, or having previously signed the declaration by United Nations of 12th January, 1942, sign the present Charter and ratify it in accordance with Article 110.

Article 4

1. Membership in the United Nations is open' to all other peace-loving States which accept the obligations contained in the present Charter and, in the judgment of the organization, are able and willing to carry out these obligations.

2. The admission of any State to membership in the United Nations will be effected by a decision of the General Assembly upon the recommendation of the Security Council.

Article 5

A member of the United Nations against which preventive or enforcement action has been taken by the Security Council may be suspended from the exercise of the rights and privileges of membership by the General Assembly upon the recommendation of the Security Council. The exercise of these rights and privileges may be restored by the Security Council.

Article 6

A member of the United Nations which has persistently violated the principles contained in the present Charter may be expelled from the organization by the General Assembly upon the recommendation of the Security Council.

CHAPTER III.—ORGANS

Article 7

1. There are established as the principal organs of the United Nations: a General Assembly, a Security Council, an Economic and Social Council, a Trusteeship Council, an International Court of Justice, and a Secretariat.

2. Such subsidiary organs as may be found necessary may be established in accordance with the pre-

sent Charter.

Article 8

The United Nations shall place no restrictions on the eligibility of men and women to participate in any capacity and under conditions of equality in its principal and subsidiary organs.

CHAPTER IV .- THE GENERAL ASSEMBLY-COMPOSITION

Article 9

1. The General Assembly shall consist of all the members of the United Nations.

2. Each member shall have not more than five representatives in the General Assembly.

FUNCTIONS AND POWERS

Article 10

The General Assembly may discuss any questions or any matters within the scope of the present Charter or relating to the powers and functions of any organs provided in the present Charter, and, except as provided in Article 12, may make recommendations to the members of the United Nations or to the Security Council or to both on any such questions or matters.

Article 11

1. The General Assembly may consider the general principles of co-operation in the maintenance of international peace and security, including the principles governing disarmament and the regulation of armaments, and may make recommendations with regard to such principles to the members or to the

Security Council or both.

- 2. The General Assembly may discuss any questions relating to the maintenance of international peace and security brought before it by any member of the United Nations, or by the Security Council, or by a State which is not a member of the United Nations in accordance with Article 35, paragraph 2, and, except as provided in Article 12, may make re-commendations with regard to any such questions to the State or States concerned or to the Security Council or to both. Any such question on which action is necessary shall be referred to the Security Council by the General Assembly either before or after discussion.
- 3. The General Assembly may call the attention of the Security Council to situations which are likely to endanger international peace and security.

4. The powers of the General Assembly set out in this article shall not limit the general scope of Article 10.

Article 12

1. While the Security Council is exercising in respect of any dispute or situation the functions assigned to it in the present Charter, the General Assembly shall not make any recommendation with regard to that dispute or situation unless the Security

Council so requests.

2. The Secretary-General, with the consent of the Security Council, shall notify the General Assembly at each session of any matters relative to the maintenance of international peace and security which are being dealt with by the Security Council and shall similarly notify the General Assembly, or the members of the United Nations if the General Assembly is not in session, immediately the Security Council ceases to deal with such matters.

Article 13

1. The General Assembly shall initiate studies and

make recommendations for the purpose of:
(a) Promoting international co-operation in the political field and encouraging the progressive development of international law and its codification:

- (b) Promoting international co-operation in the economic, social, cultural, educational, and health fields, and assisting in the realization of human rights and fundamental freedoms for all without distinction as to race, sex, language or religion.
- 2. The further responsibilities, functions, and powers of the General Assembly with respect to matters mentioned in paragraph (b) above are set forth in Chapters IX and X.

Article 14

Subject to the provisions of Article 12, the General Assembly may recommend measures for the peaceful adjustment of any situation, regardless of origin, which it deems likely to impair the general welfare or friendly relations among nations, including situations resulting from a violation of the provisions of the present Charter setting forth the purposes and principles of the United Nations.

Article 15

1. The General Assembly shall receive and consider annual and special reports from the Security Council; these reports include an account of the measures that the Security Council has decided upon or taken to maintain international peace and security.

2. The General Assembly shall receive and consider reports from the other organs of the United Nations.

Article 16

The General Assembly shall perform such functions with respect to the international trusteeship system as are assigned to it under Chapters XII and XIII, including the approval of the trusteeship agreements for areas not designated as strategic.

Article 17

1. The General Assembly shall consider and approve the budget of the organization.

2. The expenses of the organization shall be borne by the members as apportioned by the General

Assembly.

3. The General Assembly shall consider and approve any financial and budgetary arrangements with specialized agencies referred to in Article 57 and shall examine the administrative budgets of such specialized agencies with a view to making recommendations to the agencies concerned.

VOTING

Article 18

1. Each member of the General Assembly shall have one vote.

2. Decisions of the General Assembly on important questions shall be made by a two-thirds majority of the members present and voting. These questions shall include: recommendations with respect to the maintenance of international peace and security, the election of the non-permanent members of the Security Council, the election of the members of the Economic and Social Council, the election of members of the Trusteeship Council in accordance with Paragraph 1 (c) of Article 88, the admission of new members to the United Nations, the suspension of the rights and privileges of memberships, the expulsion of members, questions relating to the operation of the trusteeship system, and budgetary questions.

3. Decisions on other questions, including the determination of additional categories of questions

to be decided by a two-thirds majority, shall be made by a majority of the members present and voting.

Article 19

A member of the United Nations which is in arrears in the payment of its financial contributions to the organization shall have no vote in the General Assembly if the amount of its arrears equals or exceeds the amount of the contributions due from it for the preceding two full years. The General Assembly may, nevertheless, permit such a member to vote if it is satisfied that the failure to pay is due to conditions beyond the control of the member.

Article 20

The General Assembly shall meet in regular annual sessions and in such special sessions as occasion may require. Special sessions shall be convoked by the Secretary-General at the request of the Security Council or of a majority of the members of the United Nations.

Article 21

The General Assembly shall adopt its own rules of procedure. It shall elect its president for each session.

Article 22

The General Assembly may establish such subsidiary organs as it deems necessary for the performance of its functions.

CHAPTER V.—THE SECURITY COUNCIL— COMPOSITION

Article 23

1. The Security Council shall consist of 11 members of the United Nations. The Republic of China, France, the Union of Soviet Socialist Republics, the United Kingdom of Great Britain and Northern Ireland, and the United States of America shall be permanent members of the Security Council, due regard being specially paid, in the first instance, to the contribution of members of the United Nations to the maintenance of international peace and security and to the other purposes of the organization, and alsoto equitable geographical distribution.

2. The non-permanent members of the Security Council shall be elected for a term of two years. In the first election of the non-permanent members, however, three shall be chosen for a term of one year. A retiring member shall not be eligible for imme-

diate re-election.

3. Each member of the Security Council shall have one representative.

FUNCTIONS AND POWERS

Article 24

1. In order to ensure prompt and effective action by the United Nations, its members confer on the Security Council primary responsibility for the maintenance of international peace and security, and agree that in carrying out its duties under this responsibility the Security Council acts on their behalf.

2. In discharging these duties the Security Council shall act in accordance with the purposes and principles of the United Nations. The specific powers granted to the Security Council for the discharge of these duties are laid down in Chapters VI, VII, VIII and XII.

3. The Security Council shall submit annual and, when necessary, special reports to the General Assembly for its consideration.

Article 25

The members of the United Nations agree to accept and carry out the decisions of the Security Council in accordance with the present Charter.

Article 26

In order to promote the establishment and maintenance of international peace and security with the least diversion for armaments of the world's human and economic resources, the Security Council shall be responsible for formulating, with the assistance of the Military Staff Committee referred to in Article 47, plans to be submitted to the members of the United Nations for the establishment of a system for the regulation of armaments.

VOTING

Article 27

1. Each member of the Security Council shall have

2. Decisions of the Security Council on procedural matters shall be made by an affirmative vote of seven

members.

3. Decisions of the Security Council on all other matters shall be made by an affirmative vote of seven members including the concurring votes of the permanent members; provided that, in decisions under Chapter II and under paragraph 3 of Article 52, a party to a dispute shall abstain from voting.

PROCEDURE

Article 28

- 1. The Security Council shall be so organized as to be able to function continuously. Each member of the Security Council shall for this purpose be represented at all times at the seat of the organization.
- 2. The Security Council shall hold periodic meetings at which each of its members may, if it so desires, be represented by a member of the government or by some other specially designated representative.
- 3. The Security Council may hold meetings at such places other than the seat of the organization as in its judgment will best facilitate its work.

Article 29

The Security Council may establish subsidiary organs as it deems necessary for the performance of its functions.

Article 30

The Security Council shall adopt its own rules of procedure, including the method of selecting its president.

Article 31

Any member of the United Nations may participate, without vote, in the discussion of any question brought before the Security Council whenever the latter considers that the interests of that member are specially affected.

Article 32

Any member of the United Nations which is not a member of the Security Council or any State which is not a member of the United Nations, if it is a party to a dispute under consideration by the Security Council, shall be invited to participate, without vote, in the discussion relating to the dispute.

The Security Council shall lay down such condi-

tions as it deems just for the participation of a State which is not a member of the United Nations.

CHAPTER VI.—PACIFIC SETTLEMENTS OF DISPUTE

Article 33

1. The parties to any dispute, the continuance of which is likely to endanger the maintenance of international peace and security, shall, first of all, seek a solution by negotiation, inquiry, mediation, conciliation, arbitration, judicial settlement, resort to regional agencies or arrangements, or other peaceful means of their own choice.

2. The Security Council shall, when it deems necessary, call upon the parties to settle their dispute by

such means.

Article 34

The Security Council may investigate any dispute, or any situation which might lead to international friction or give rise to a dispute, in order to determine whether its continuance is likely to endanger the maintenance of international peace and security.

Article 35

1. Any member of the United Nations may bring any dispute or any situation of the nature referred to in Article 34 to the attention of the Security Coun-

cil or of the General Assembly.

2. A State which is not a member of the United Nations may bring to the attention of the Security Council or of the General Assembly any dispute to which it is a party, if it accepts in advance, for the purposes of the dispute, the obligations of pacific

settlement provided in the present Charter.

3. The proceedings of the General Assembly in respect of matters brought to its attention under this article will be subject to the provisions of Articles

11 and 12.

Article 36

1. The Security Council may, at any stage of a dispute of the nature referred to in Article 33 or of a situation of like nature, recommend appropriate procedures or methods of adjustment.

2. The Security Council should take into consideration any procedures for the settlement of the dis-

pute which have already been adopted by the parties.

3. In making recommendations under this article the Security Council should also take into consideration that legal disputes should as a general rule be referred by the parties to the International Court of Justice in accordance with the provisions of the Statute of the Court.

Article 37

1. Should the parties to a dispute of the nature referred to in Article 33 fail to settle it by the means indicated in that article, they shall refer it to the Security Council.

2. If the Security Council deems that the continuance of the dispute is in fact likely to endanger the maintenance of international peace and security, it shall decide whether to take action under Article 36 or to recommend such terms of settlement as it may consider appropriate.

Article 38

Without prejudice to the provisions of Articles 33-37 the Security Council may, if all the parties to any dispute so request, make recommendations to the parties with a view to a pacific settlement of the dispute.

CHAPTER VII.—ACTION WITH RESPECT TO THREATS TO THE PEACE, BREACHES OF THE PEACE, AND ACTS OF AGGRESSION

Article 39

The Security Council shall determine the existence of any threat to the peace, breach of the peace, or act of aggression, and shall make recommendations, or decide what measures shall be taken in accordance with Articles 41 and 42, to maintain or restore international peace and security.

Article 40

In order to prevent an aggravation of the situation, the Security Council may, before making the recommendations or deciding upon the measures provided for in Article 41, call upon the parties concerned to comply with such provisional measures as it deems necessary or desirable. Such provisional measures shall be without prejudice to the rights, claims or position of the parties concerned. The Security Council shall duly take account of failure to comply with such provisional measures.

Article 41

The Security Council may decide what measures not involving the use of armed force are to be employed to give effect to its decisions, and it may call upon the members of the United Nations to apply such measures. These may include complete or partial interruption of economic relations and of rail, sea, air, postal, telegraphic, radio, and other means of communication, and the severance of diplomatic relations.

Article 42

Should the Security Council consider that measures provided for in Article 41 would be inadequate or have proved to be inadequate, it may take such action by air, sea, or land forces as may be necessary to maintain or restore international peace and security. Such actions may include demonstrations, blockade and other operations by air, sea or land forces of members of the United Nations.

Article 43

1. All members of the United Nations, in order to contribute to the maintenance of international peace and security, undertake to make available to the Security Council, on its call and in accordance with a special agreement or agreements, armed forces, assistance, and facilities, including rights of passage, necessary for the purpose of maintaining international peace and security.

2. Such agreement or agreements shall govern the numbers and types of forces, their degree of readiness and general location, and the nature of the

facilities and assistance to be provided.

3. The agreement or agreements shall be negotiated as soon as possible on the initiative of the Security Council. They shall be concluded between the Security Council and members or between the Security Council and groups of members and shall be subject to ratification by the signatory States in accordance with their constitutional processes.

Article 44

When the Security Council has decided to use force it shall, before calling upon a member not represented on it to provide armed forces in fulfilment of the obligations assumed under Article 43, invite that member, if the member so desires, to partici-

pate in the decisions of the Security Council concerning the employment of contingents of that member's armed forces.

Article 45

In order to enable the United Nations to take ugrent military measures, members shall hold immediately available national air-force contingents for combined international enforcement action. The strength and degree of readiness of these contingents and plans for their combined action shall be determined, within the limits laid down in the special agreement or agreements referred to in Article 43, by the Security Council with the assurance of the Military Staff Committee.

Article 46

Plans for the application of armed force shall be made by the Security Council with the assistance of the Military Staff Committee.

1. There shall be established a Military Staff Committee to advise and assist the Security Council on all questions relating to the Security Council's military requirements for the maintenance of international peace and security, the employment and command of forces yplaced at its disposal, the regulation of armaments, and possible disarmament.

2. The Military Staff Committee shall consist of the Chiefs of Staff of the permanent members of the Security Council or their representatives. Any member of the United Nations not permanently represented on the Committee shall be invited by the Committee to be associated with it when the efficient

discharge of the Committee's responsibilities required the participation of that member in its work.

3. The Military Staff Committee shall be responsible under the Security Council for the strategic direction of any armed forces placed at the disposal of the Security Council. Questions relating to the command of such forces shall be worked out subse-

quently.

4. The Military Staff Committee, with the authorization of the Security Council and after consultation with appropriate regional agencies, may establish regional sub-committees.

Article 48

1. The action required to carry out the decisions of the Security Council for the maintenance of international peace and security shall be taken by all the members of the United Nations or by some of them, as the Security Council may determine.

them, as the Security Council may determine.

2. Such decisions shall be carried out by the members of the United Nations directly and through their action in the appropriate international agencies of

which they are members.

Article 49

The members of the United Nations shall join in affording mutual assistance in carrying out the measures decided upon by the Security Council.

Article 50

If preventive or enforcement measures against any state are taken by the Security Council, any other state, whether a member of the United Nations or not, which finds itself confronted with special economic problems arising from the carrying out of those measures shall have the right to consult the Security Council with regard to a solution of those problems.



Article 51

Nothing in the present Charter shall impair the inherent right of individual or collective self-defence if an armed attack occurs against a member of the United Nations, until the Security Council has taken the measure necessary to maintain international peace and security. Measures taken by members in the exercise of this right of self-defence shall be immediately reported to the Security Council and shall not in any way affect the authority and responsibility of the Security Council under the present Charter to take at any time such action as it deems neces-sary in order to maintain or restore international peace and security.

CHAPTER VIII.—REGIONAL ARRANGEMENTS

Article 52

1. Nothing in the present Charter precludes the existence of regional arrangements or agencies for dealing with such matters relating to the mainten-ance of international peace and security as are ap-propriate for regional action, provided that such arrangements or agencies and their activities are consistent with the purposes and principles of the United Nations.

2. The members of the United Nations entering into such arrangements or constituting such agencies shall make every effort to achieve pacific settlement of local disputes through such regional arrangements or by such regional agencies before referring them to the Security Council.

3. The Security Council shall encourage the development of pacific settlement of local disputes through such regional arrangements or by such regional agencies either on the initiative of the States concerned or by reference from the Security Council.

4. This Article in no way impairs the application

of Articles 33 and 34.

Article 53

1. The Security Council shall, where appropriate, utilize such regional arrangements or agencies for enforcement action under its authority. But no enforcement action shall be taken under regional arrangement or by regional agencies without the authorization of the Security Council with the exception of measures against any enemy State, as defined in Paragraph 2 of this Article, provided for pursuant to Article 107 or in regional arrangements directed against renewal of aggressive policy on the part of any such State, until such time as the organization may, on request of the governments concerned, be charged with the responsibility for preventing further aggression by such a State.

2. The term "enemy State" as used in Paragraph 1 of this Article applies to any State which during the Second World War has been an enemy of any signatory of the present Charter.

Article 54

The Security Council shall at all times be kept fully informed of activities undertaken or in contemplation under regional arrangements or by regional agencies for the maintenance of international peace and security.

CHAPTER IX.—INTERNATIONAL ECONOMIC AND SOCIAL CO-OPERATION

Article 55

With a view to the creation of conditions of stability and well-being which are necessary for peaceful and friendly relations among nations based on respect for the principle of equal rights and self-determination of peoples, the United Nations shall promote:

(a) Higher standards of living, full employment, and conditions of economic and social progress and development:

(b) solutions of international economic, social, health and related problems; and international cultural and educational co-operation; and

(c) universal respect for, and observance of, human rights and fundamental freedoms for all without distinction as to race, language or religion.

Article 56

All members pledge themselves to take joint and separate action in co-operation with the organization for the achievement of the purposes set forth in Article 55.

Article 57

1. The various specialized agencies, established by inter-governmental agreement and having wide international responsibilities, as defined in their basic instruments, in economic, social, cultural, educational, health and related fields, shall be brought into relationship with the United Nations in accordance with the provisions of Article 63.

2. Such agencies thus brought into relationship with the United Nations are hereinafter referred to as "specialized agencies."

Article 58

The organization shall make recommendations for the co-ordination of the policies and activities of the specialized agencies.

Article 59

The organization shall, where appropriate, initiate negotiations among the States concerned for the creation of any new specialized agencies required for the accomplishment of the purposes set forth in Article

Article 60

Responsibility for the discharge of the functions of the organization set forth in this chapter shall be vested in the General Assembly and, under the authority of the General Assembly, in the Economic and Social Council, which shall have for this purpose the powers set forth in Chapter X.

CHAPTER X.—ECONOMIC AND SOCIAL COUNCIL COMPOSITION

Article 61

1. The Economic and Social Council shall consist of eighteen members of the United Nations elected by the General Assembly.
2. Subject to the provisions of paragraph 3, six

members of the Economic and Social Council shall be elected each year for a term of three years. A retiring member shall be eligible for immediate reelection.

3. At the first election, eighteen members of the Economic and Social Council shall be chosen, the term of office of six members so chosen shall expire at the end of one year, and of six other members at the end of two years, in accordance with arrangements made by the General Assembly.

4. Each member of the Economic and Social

Council shall have one representative.

FUNCTIONS AND POWERS

Article 62

1. The Economic and Social Council may make or initiate studies and reports with respect to international, economic, social, cultural, educational, health and related matters and may make recommendations with respect to any such matters to the General Assembly, to the members of the United Nations and to the specialized agencies concerned.

2. It may make recommendations for the purpose of promoting respect for, and observance of, human

rights and fundamental freedoms for all.

3. It may prepare draft conventions for submission to the General Assembly, with respect to matters falling within its competence.

4. It may call, in accordance with the rules prescribed by the United Nations, international conferences on matters falling within its competence.

Article 63

1. The Economic and Social Council may enter into agreements with any of the agencies referred to in Article 57, defining the terms on which the agency concerned shall be brought into relationship with the United Nations. Such agreements shall be subject to approval by the General Assembly.

2. It may co-ordinate the activities of the specialized agencies through consultation with and recommendations to such agencies and through recommendations to the General Assembly and to the members

of the United Nations.

Article 64

1. The Economic and Social Council may take appropriate steps to obtain regular reports from the specialized agencies. It may make arrangements with the members of the United Nations and with the specialized agencies to obtain reports on the steps taken to give effect to its own recommendations and to recommendations on matters falling within its competence made by the General Assembly.

2. It may communicate its observations on these

reports to the General Assembly

Article 65

The Economic and Social Council may furnish information to the Security Council and shall assist the Security Council upon its request.

Article 66

1. The Economic and Social Council shall perform such functions as fall within its competence in connection with the carrying out of the recommendations of the General Assembly.

2. It may, with the approval of the General Assembly, perform services at the request of members of the United Nations and at the request of special-

ized agencies.

3. It shall perform such other functions as are specified elsewhere in the present Charter or as may be assigned to it by the General Assembly.

VOTING

Article 67

1. Each member of the Econômic and Social Council shall have one vote.

2. Decisions of the Economic and Social Council shall be made by a majority of the members present and voting.

PROCEDURE

Article 68

The Economic and Social Council shall set up commissions in economic and social fields and for the promotion of human rights, and such other commissions as may be required for the performance of its functions.

Article 69

The Economic and Social Council shall invite any member of the United Nations to participate, without vote, in its deliberations on any matter of particular concern to that member.

Article 70

The Economic and Social Council may make arrangements for representatives of the specialized agencies to participate, without vote, in its delibera-tions and in those of the commissions established by it, and for its representatives to participate in the deliberations of the specialized agencies.

Article 71

The Economic and Social Council may make suitable arrangements for consultation with non-governmental organizations which are concerned with matters within its competence.

Such arrangements may be made with international organizations and, where appropriate, with national organizations after consultation with the member of

the United Nations concerned.

Article 72

1. The Economic and Social Council shall adopt its own rules of procedure, including the method of

selecting its president.

2. The Economic and Social Council shall meet as required in accordance with its rules, which shall include provision for the convening of meetings on request of a majority of its members.

CHAPTER XI.—DECLARATION REGARDING NON-SELF-GOVERNING TERRITORIES

Article 73

Members of the United Nations which have or assume responsibilities for the administration of territories whose peoples have not yet attained a full measure of self-government recognize the principle that the interests of the inhabitants of these territories are paramount, and accept as a sacred trust the obligation to promote to the utmost, within the system of international peace and security established by the present Charter, the well-being of the inhabitants of these territories, and, to this end:

- (a) To ensure, with due respect for the culture of the peoples concerned, their political, economic, social and educational advancement, their just treatment, and their protection against
- (b) To develop self-government, to take due account of the political aspirations of the peoples, and to assist them in the progressive development of their free political institutions, according to the particular circumstances of each territory and its peoples and their varying stages of advancement;

(c) To further international peace and security;
(d) To promote constructive measures of development, to encourage research, and to co-operate with one another and, when and where appro-

priate, with specialized international bodies with a view to the practical achievement of the social, economic and scientific purposes set forth in this Article; and

(e) To transmit regularly to the Secretary-General for information purposes, subject to such limitation as security and constitutional considerations may require, statistical and other information of a technical nature relating to economic, social and educational conditions in the territories for which they are respectively responsible other than those territories to which Chapters XII and XIII apply.

Article 74

Members of the United Nations also agree that their policy in respect of the territories to which this chapter applies, no less than in respect of their metropolitan areas, must be based on the general principle of good neighbourliness due account being taken of the interests and well-being of the rest of the world, in social, economic and commercial matters.

CHAPTER XII.—INTERNATIONAL TRUSTEESHIP SYSTEM

Article 75

The United Nations shall establish under its authority an International Trusteeship System for the administration and supervision of such territories as may be placed thereunder by subsequent individual agreements. These territories are hereinafter referred to as Trust Territories.

Article 76

The basic objectives of the Trusteeship System, in accordance with the purposes of the United Nations laid down in Article 1 of the present charter, shall

(a) To further international peace and security;

(b) To promote the political, economic, social and educational advancement of the inhabitants of the Trust Territories, and their progressive development towards self-government or inde-pendence as may be appropriate to the particular circumstances of each territory and its peoples and the freely expressed wishes of the people concerned, and as may be provided by the terms of each trusteeship agreement;

(c) To encourage respect for human rights and for fundamental freedoms for all without distinction as to race, sex, language, or religion, and to encourage recognition of the interdependence of the peoples of the world; and

(d) To ensure equal treatment in social, economic and commercial matters for all members of the United Nations and their nationals, and also equal treatment for the latter in the administration of justice, without prejudice to the attainment of the foregoing objectives and subject to the provisions of Article 80.

Article 77

1. The Trusteeship System shall apply to such territories in the following categories as may be placed thereunder by means of trusteeship agree-

(a) Territories now held under mandate;

(b) Territories which may be detached from enemy States as a result of the Second World War;

(c) Territories voluntarily placed under the system by States responsible for their administration.

2. It will be a matter for subsequent agreement as to which territories in the foregoing categories will be brought under the Trusteeship System and upon what terms.

Article 78

The Trusteeship System shall not apply to territories which have become members of the United Nations, relationship among which shall be based on respect for the principle of sovereign equality.

Article 79

The terms of trusteeship for each territory to be placed under the Trusteeship System, including any alteration or amendment, shall be agreed upon by the States directly concerned, including the mandatory power in the case of territories held under mandate by a member of the United Nations, and shall be approved as provided for in Articles 83 and 85.

Article 80

1. Except as may be agreed upon in individual trusteeship agreements, made under Articles 77, 79 and 81, placing each territory under the Trusteeship System, and until such agreements have been concluded, nothing in this chapter shall be construed in or of itself to alter in any manner the rights whatsoever of any States or any peoples or the terms of existing international instruments to which members may respectively be parties.

2. Paragraph 1 of this Article shall not be inter-

preted as giving grounds for delay or postponement of the negotiation and conclusion of agreements for placing mandated and other territories under the Trusteeship System as provided for in Article 77.

Article 81

The trusteeship agreement shall in each case include the terms under which the Trust Territory will be administered and designate the authority which will exercise the administration of the Trust Territory. Such authority, heremafter called the Administering Authority, may be one or more States or the organization itself.

Article 82

There may be designated, in any trusteeship agreement, a strategic area or areas which may include part or all of the Trust Territory to which the agreement applies, without prejudice to any special agreement or agreements made under Article 43.

Article 83

1. All functions of the United Nations relating to strategic areas, including the approval of the terms of the trusteeship agreements and of their alteration or amendment, shall be exercised by the Security Council.

2. The basic objectives set forth in Article 76 shall be applicable to the people of each strategic area.

3. The Security Council shall, subject to the provisions of the trusteeship agreements and without prejudice to security considerations, avail itself of the assistance of the Trusteeship Council to perform those functions of the United Nations under the Trusteeship System relating to political, economic. social, and educational matters in the strategic areas.

Article 84

It shall be the duty of the Administering Authority to ensure that the Trust Territory shall play its part in the maintenance of international peace and security. To this end the Administering Authority

may make use of volunteer forces, facilities, and assistance from the Trust Territory in carrying out the obligations towards the Security Council undertaken in this regard by the Administering Authority as well as for local defence and the maintenance of law and order within the Trust Territory.

Article 85

1. The functions of the United Nations with regard to trusteeship agreements for all areas designated as strategic, including the approval of the terms of the trusteeship agreements and of their alteration or amendment, shall be exercised by the General Assembly in carrying out these functions.

2. The Trusteeship Council, operating under the

authority of the General Assembly, shall assist the General Assembly in carrying out these functions.

CHAPTER XIII.—THE TRUSTEESHIP COUNCIL COMPOSITION

Article 86

- 1. The Trusteeship Council shall consist of the following members of the United Nations:
 - (a) Those members administering Trust Territories;
 - (b) Such of those members mentioned by name in Article 23 as are not administering Trust Territories; and
 - (c) As many other members elected for three-year terms by the General Assembly as may be necessary to ensure that the total number of members of the Trusteeship Council is equally divided between those members of the United Nations which administer Trust Territories and those which do not.
- 2. Each member of the Trusteeship Council shall designate one specially qualified person to represent it therein.

FUNCTIONS AND POWERS

Article 87

- 1. The General Assembly and, under its authority, the Trusteeship Council, in carrying out their functions, may:
 - (a) Consider reports submitted by the Administering Authority;
 - (b) Accept petitions and examine them in consul-
 - tation with the Administering Authority;
 (c) Provide for periodic visits to the respective
 Trust Territories at times agreed upon with the Administering Authority; and
 - (d) Take these and other actions in conformity with the terms of the trusteeship agreements.

Article 88

- 1. The Trusteeship Council shall formulate a questionnaire on the political, economic, social, and educational advancement of the inhabitants of each Trust Territory, and the Administering Authority for each Trust Territory within the competence of the General Assembly shall make an annual report to the General Assembly upon the basis of such a question-
- 2. The General Assembly may, when it deems necessary, itself exercise any of these functions and

VOTING

Article 89

1. Each member of the Trusteeship Council shall have one vote.

2. Decisions of the Trusteeship Council shall be made by a majority of the members present and

PROCEDURE

Article 90

1. The Trusteeship Council shall adopt its own rules procedure, including the method of selecting its president.

2. The Trusteeship Council shall meet as required in accordance with its rules, which shall include pro-vision for the convening of meetings on the request of a majority of its members.

Article 91

The Trusteeship Council shall, when appropriate, avail itself of the assistance of the Economic and Social Council and of the specialized agences in regard to matters with which they are respectively concerned.

CHAPTER XIV.—THE INTERNATIONAL COURT OF JUSTICE

Article 92

The International Court of Justice shall be the principal organ of the United Nations. It shall function in accordance with the annexed Statute, which is based upon the Statute of the Permanent Court of International Justice and forms an integral part of the present Charter.

Article 93

1. All members of the United Nations are ipso facto parties to the Statute of the International Court of Justice.

2. A State which is not a member of the United Nations may become a party to the Statute of the International Court of Justice on conditions to be determined in each case by the General Assembly upon the recommendation of the Security Council.

Article 94

1. Each member of the United Nations undertakes to comply with the decision of the International Court of Justice in any case to which it is a party.

2. If any party to a case fails to perform the obligations incumbent upon it under a judgment rendered by the Court, the other party may have recourse to the Security Council, which may, if it deems necessary, make recommendation or decide upon measures to be taken to give effect to the iudgment.

Article 95

Nothing in the present Charter shall prevent members of the United Nations from entrusting the solution of their differences to other tribunals by virtue of agreements already in existence or which may be concluded in the future.

Article 96

1. The General Assembly or the Security Council may request the International Court of Justice to give an advisory opinion on any legal question.

2. Other organs of the United Nations and speci-

alized agencies, which may at any time be so authorized by the General Assembly, may also request advisory opinions of the Court on legal questions arising within the scope of their activities.

CHAPTER XV.—THE SECRETARIAT

Article 97

The Secretariat shall comprise a Secretary-General and such staff as the organization may require. The Secretary-General shall be appointed by the General Assembly upon the recommendation of the Security Council. He shall be the chief administrative officer of the organization.

Article 98

The Secretary-General shall act in that capacity in all meetings of the General Assembly, of the Security Council, of the Economic and Social Council, and of the Trusteeship Council, and shall perform such other functions as are entrusted to him by these organs. The Secretary-General shall make an annual report to the General Assembly on the work of the organization.

Article 99

The Secretary-General may bring to the attention of the Security Council any matter which in his opinion may threaten the maintenance of international peace and security.

Article 100

1. In the performance of their duties the Secretary-General and the staff shall not seek or receive instructions from any Government or from any other authority eternal to the organization. They shall refrain from any action which might reflect on their position as international officials who are responsible only to the organization.

2. Each member of the United Nations undertakes to respect the exclusively international character of the responsibilities of the Secretary-General and the staff and not to seek to influence them in the dis-

charge of their responsibilities.

Article 101

1. The staff shall be appointed by the Secretary-General under regulations established by the General

Assembly.

2. Appropriate staffs shall be permanently assigned to the Economic and Social Council, the Trusteeship Council, and, as required, to other organs of the United Nations. These staffs shall form a part of the Secretariat.

3. The paramount consideration in the employment of the staff and in the determination of the conditions of service shall be the necessity of securing the highest standards of efficiency, competence and integrity. Due regard shall be paid to the importance of recruiting the staff on as wide a geographical basis as possible.

CHAPTER XVI.—MISCELLANEOUS PROVISIONS

Article 102

1. Every treaty and every international agreement entered into by any member of the United Nations after the present Charter comes into force shall as soon as possible be registered with the Secretariat and published by it.

2. No party to any such treaty or international agreement which has not been registered in accordance with the provisions of Paragraph 1 of this Article may invoke that treaty or agreement before any organ of the United Nations.

Article 103

In the event of a conflict between the obligations of the members of the United Nations under the present Charter and any other international obligations to which they are subject, their obligations under the present Charter shall prevail.

Article 104

The organization shall enjoy in the territory of each of its members such legal capacity as may be necessary for the exercise of its functions and the fulfilment of its purposes.

Article 105

1. The organization shall enjoy in th eterritory of each of its members such privileges and immunities as are necessary for the fulfilment of its purposes.

2. Representatives of the members of the United Nations and officials of the organization shall similarly enjoy such privileges and immunities as are necessary for the independent exercise of their func-

tions in connection with the organization.

3. The General Assembly may make recommendations with a view to determining the details of the application of paragraphs 1 and 2 of this Article or may propose conventions to the members of the United Nations for this purpose.

CHAPTER XVII.—TRANSITIONAL SECURITY **ARRANGEMENTS**

Article 106

Pending the coming into force of such special agreements referred to in Article 43 as in the opinion of the Security Council enable it to begin the exercise of its responsibilities under Article 42, the parties to the Four-Nation Declaration, signed at Moscow, 30th October, 1943, and France, shall, in accordance with the provisions of Paragraph 5 of that Declaration, consult with one another and as occasion arises with other members of the United Nations with a view to such joint action on behalf of the organization as may be necessary for the purpose of maintaining international peace and security.

Article 107

Nothing in the present Charter shall invalidate or preclude action, in relation to any State which during the Second World War has been an enemy of any signatory to the present Charter, taken or authorized as a result of that war by the Governments having responsibility for such action.

CHAPTER XVIII. - AMENDMENTS

Article 108

Amendments to the present Charter shall come into force for all members of the United Nations when they have been adopted by a vote of two-thirds of the members of the General Assembly and ratified in accordance with their respective constitutional processes by two-thirds of the members of the United Nations, including all the permanent members of the Security Council.

Article 109

1. A general conference of the members of the United Nations for the purpose of reviewing the present Charter may be held at a date and place to be fixed by a two-thirds vote of the members of the General Assembly and by a vote of any seven members of the Security Council. Each member shall

have one vote in the conference.

2. Any alteration of the present Charter recommended by a two-thirds vote of the conference shall take effect when ratified in accordance with their respective constitutional processes by two-thirds of the members of the United Nations including all the permanent members of the Security Council.

3. If such a conference has not been held before the tenth annual session of the General Assembly fol-lowing the entry into force of the present Charter, the proposal to call such a conference shall be placed on the agenda of that session of the General Assembly and the conference shall be held if so decided by a majority vote of the members of the General Assembly and by a vote of any seven members of the Security Council.

CHAPTER XIX.—RATIFICATION AND SIGNATURE

Article 110

1. The present Charter shall be ratified by the signatory States in accordance with their respective

constitutional processes.

2. The ratifications shall be deposited with the Government of the United States of America, which shall notify all the signatory States of each deposit as well as the Secretary-General of the organization when he has been appointed

3. The present Charter shall come into force upon the deposit of ratifications by the Republic of China, France, the Union of Soviet Socialist Republics, the United Kingdom of Great Britain and Northern Ireland, and the United States of America, and by a majority of the other signatory States. A protocol of the ratifications deposited shall thereupon be drawn up by the Government of the United States of America which shall communicate copies thereof to all the signatory States.

4. The States signatory to the present Charter which ratify it after it has come into force will become original members of the United Nations on the date of the deposit of their respective ratifications.

Article 111

The present Charter, of which the Chinese, English, French, Russian and Spanish texts are equally authentic, shall remain deposited in the archives of the Government of the United States of America. Duly certified copies thereof shall be transmitted by that Government to the Governments of the other signatory States.

In faith whereof the representatives of the United

Nations have signed the present Charter.

Done at the City of San Francisco the twentysixth day of June, one thousand nine hundred and forty-five.

Text of Agreement of Potsdam Conference

ESCRIBED as "Report on the Tripartite Conference of Berlin," the agreement is as follows:

On 17th July, 1945, the President of the United States of America, Harry S. Truman, the Chairman of the Council of People's Commissars of the Union Soviet Socialist Republics, Generalissimo J. V. Stalin, and the Prime Minister of Great Britain. Winston S. Churchill, together with Mr. Clement R. Attlee, met in the Tripartite Conference of Berlin.

They were accompanied by the Foreign Secretaries of the three Governments, Mr. James F. Byrnes, Mr. M. Molotov, and Mr. Anthony Eden, the Chiefs

of Staff, and other advisers.

There were nine meetings between 17th July and 25th July. The Conference was then interrupted for two days while the results of the British General

Election were being declared.

On 28th July, Mr. Attlee returned to the Conference as Prime Minister, accompanied by the new Secretary for Foreign Affairs, Mr. Ernest Bevin. Four days of further discussion then took place. During the course of the Conference there were regular meetings of the Heads of the three Governments accompanied by the Foreign Secretaries, and also of the Foreign Secretaries alone. Committees appointed by the Foreign Secretaries for preliminary consideration of questions before the Conference also met

The meetings of the Conference were held at the Cecilienhof, near Potsdam. The Conference ended on

2nd August, 1945.

Important decisions and agreements were reached. Views were exchanged on a number of other questions and consideration of these matters will be continued by the Council of Foreign Ministers established by the Conference.

President Truman, Generalissimo Stalin and Prime Minister Attlee leave this Conference, which has strengthened the ties between the three Governments and extended the scope of their collaboration and understanding, with renewed confidence that their Governments and peoples, together with the other United Nations, will ensure the creation of a just and enduring peace.

II.—ESTABLISHMENT OF A COUNCIL OF FOREIGN **MINISTERS**

The Conference reached an agreement for the establishment of a Council of Foreign Ministers representing the five principal Powers to continue the necessary preparatory work for the peace settlements and to take up other matters which from time to time may be referred to the Council by agreement of the

Governments participating in the Council.

The text of the agreement for the establishment of the Council of Foreign Ministers is as follows:

"(1) There shall be established a Council composed of the Foreign Ministers of the United Kingdom, the Union of Soviet Socialist Republics, China, France and the United States.

(2) (i) The Council shall normally meet in London, which shall be the permanent seat of the joint Secretariat which the Council will form. Each of the Foreign Ministers will be accompanied by a high-ranking Deputy, duly authorized to carry on the work of the Council in the absence of his Foreign Minister, and by a small staff of technical advisers.

(ii) The first meeting of the Council shall be held in London not later than 1st September, 1945. Meetings may be held by common agreement in other capitals as may be agreed from time to time.

"(3) (i) As its immediate important task, the Coun-

cil shall be authorized to draw up, with a view to their submission to the United Nations, treaties of peace with Italy, Rumania, Bulgaria, Hungary and Finland, and to propose settlements of territorial questions outstanding on the termination of the war in Europe. The Council shall be utilized for the preparation of a peace settlement for Germany to be accepted by the Government of Germany when a Government adequate for the purpose is established.

"(ii) For the discharge of each of these tasks the Council will be composed of the members representing those States which were signatory to the terms of surrender imposed upon the enemy State concerned. For the purpose of the peace settlement for Italy, France shall be regarded a signatory to the terms of surrender for Italy. Other members will be invited to participate when matters directly concerning them are under discussion.

(iii) Other matters may from time to time be referred to the Council by agreement between the mem-

ber Governments.

"(4) (i) Whenever the Council is considering a question of direct interest to a State not represented thereon, such State should be invited to send representatives to participate in the discussion and study

of that question.

"(ii) The Council may adapt its procedure to the particular problem under consideration. In some cases it may hold its own preliminary discussions prior to the participation of other interested States. In other cases the Council may convoke a formal conference of the State chiefly interested in seeking a solution of the particular problem.

In accordance with the decision of the Conference the three Governments have each addressed an identical invitation to the Governments of China and France to adopt this text and to join in establishing

the Council.

The establishment of the Council of Foreign Ministers for the specific purposes named in the text will be without prejudice to the agreement of the Crimea Conference that there should be periodic consultation among the Foreign Secretaries of the United States, the Union of Soviet Socialist Republics and the United Kingdom.

The Conference also considered the position of the European Advisory Commission in the light of the agreement to establish the Council of Foreign Ministers. It was noted with satisfaction that the Commission had ably discharged its principal tasks by the recommendations that it had furnished for the terms of Germany's unconditional surrender, for the zones of occupation in Germany and Austria, and for the inter-Allied control machinery in those countries.

It was felt that further work of a detailed character for the co-ordination of Allied policy for the control of Germany and Austria would in future fall within the competence of the Allied Control Council at Berlin and the Allied Commission at Vienna. Accordingly it was agreed to recommend that the European Advisory Commission be dissolved.

III.—GERMANY

The Allied armies are in occupation of the whole of Germany, and the German people have begun to atone for the terrible crimes committeed under the leadership of those whom, in the hour of their success, they openly approved and blindly obeyed.

Agreement has been reached at this Conference on the political and economic principles of a co-ordinated Allied policy toward defeated Germany during the period of Allied control.

The purpose of this agreement is to carry out the Crimea declaration on Germany. German militarism and Nazism will be extirpated and the Allies will take in agreement together, now and in the future, the other measures necessary to assure that Germany never again will threaten her neighbours or the peace of the world.

It is not the intention of the Allies to destroy or enslave the German people. It is the intention of the Allies that the German people be given the opportunity to prepare for the eventual reconstruction of their life on a democratic and peaceful basis. If their own efforts are steadily directed to this end, it will be possible for them in due course to take their place among the free and peaceful peoples of the world.

The text of the agreement is as follows:

THE POLITICAL AND ECONOMIC PRINCIPLES TO GOVERN THE TREATMENT OF GERMANY IN THE INITIAL CONTROL PERIOD

A-Political Principles

1. In accordance with the Agreement on Control Machinery in Germany, supreme authority in Germany is exercised on instructions from their respective Governments, by the Commanders-in-Chief of the armed forces of the United States of America, the United Kingdom, the Union of Soviet Socialist Republics, and the French Republic, each in his own zone of occupation, and also jointly, in matters affecting Germany, as a whole, in their capacity as members of the Control Council.

2. So far as is practicable, there shall be uniformity of treatment of the German population throughout

Germany.

3. The purposes of the occupation of Germany by which the Control Council shall be guided are:

- (i) The complete disarmament and demilitarization of Germany and the elimination or control of all German industry that could be used for military production. To these ends:
 - (a) All German land, naval and air forces, the S.S., S.A., S.D., and Gestapo, with all their organizations, staffs and institutions, including the General Staff, the Officers' Corps, Reserve Corps, military schools, war veterans' organizations and all other military and quasi-military organizations, together with all clubs and associations which serve to keep alive the military tradition in Germany, shall be completely and finally abolished in such manner as permanently to prevent the revival or reorganiza-tion of German militarism and Nazism;

(b) All arms, ammunition and implements of war and all specialized facilities for their production shall be held at the disposal of the Allies or destroyed. The maintenance and production of all aircraft and all arms, ammunition and implements of war shall be prevented.

(ii) To convince the German people that they have suffered a total military defeat and that they cannot escape responsibility for what they have brought upon themselves, since their own ruthless warfare and



the fanatical Nazi resistance have destroyed German economy and made chaos and suffering inevitable.

(iii) To destroy the National Socialist party and its affiliated and supervized organizations, to dissolve all Nazi institutions, to ensure that they are not revived in any form, and to prevent all Nazi and militarist activity or propaganda.

(iv) To prepare for the eventual reconstruction of German political life on a democratic basis and for eventual peaceful co-operation in international life by

Germany

4. All Nazi laws which provided the basis of the Hitler régime or established discrimination on grounds of race, creed, or political opinion shall be abolished. No such discriminations, whether legal, administra-

tive or otherwise, shall be tolerated.

5. War criminals and those who have participated in planning or carrying out Nazi enterprises involving or resulting in atrocities or war crimes shall be arrested and brought to judgment. Nazi leaders, influential Nazi supporters and high officials of Nazi organizations and institutions and any other persons dangerous to the occupation or its objectives shall be arrested and interned

6. All members of the Nazi party who have been more than nominal participants in its activities and all other persons hostile to Allied purposes shall be removed from public and semi-public office, and from positions of responsibility in important private undertakings. Such persons shall be replaced by persons who, by their political and moral qualities, are deemed capable of assisting in developing genuine democratic institutions in Germany.

7. German education shall be so controlled as completely to eliminate Nazi and militarist doctrines and to make possible the successful development of

democratic ideas.

8. The judicial system will be reorganized in accordance with the principles of democracy, of justice under law, and of equal rights for all citizens without distinction of race, nationality or religion.

9. The administration of affairs in Germany should be directed towards the decentralization of the political structure and the development of local responsibility.

To this end:

(i) Local self-government shall restored throughout Germany on democratic principles and in particular through elective councils as rapidly as is consistent with military security and the purposes of military occupation;
(ii) All democratic political parties with rights of

assembly and of public discussion shall be allowed

and encouraged throughout Germany;

(iii) Representative and effective principles shall be introduced into regional, provincial and state (land) administration as rapidly as may be justified by the successful application of these principles in local selfgovernment

(iv) For the time being no central German government shall be established. Notwithstanding this, however, certain essential central German administrative departments, headed by State Secretaries, shall be established, particularly in the fields of finance, transport, communications, foreign trade and industry. Such departments will act under the direction of the Control Council.

10. Subject to the necessity for maintaining military security, freedom of speech, Press and religion shall be permitted, and religious institutions shall be re-

spected. Subject likewise to the maintenance of military security, the formation of free trade unions shall be permitted.

B—Economic Principles

11. In order to eliminate Germany's war potential, the production of arms, ammunition and implements of war, as well as all types of aircraft and sea-going ships, shall be prohibited and prevented. Production of metals, chemicals, machinery and other items that are directly necessary to a war economy shall be rigidly controlled and restricted to Germany's approved post-war peace-time needs to meet the objectives stated in Para. 15.

Productive capacity not needed for permitted production shall be removed in accordance with the reparations plan recommended by the Allied Commission on reparations and approved by the Governments concerned, or if not removed shall be des-

12. At the earliest practicable date, the German economy shall be decentralized for the purpose of eliminating the present excessive concentration of economic power as exemplified in particular by cartels, syndicates, trusts and other monopolistic arrangements.

13. In organizing the German economy, primary emphasis shall be given to the development of agri-

culture and peaceful domestic industries

14. During the period of occupation, Germany shall be treated as a single economic unit. To this end common policies shall be established in regard

- (a) mining and industrial production and alloca-
- (b) agriculture, forestry and fishing;

(c) wages, prices and rationing;

- (d) import and export programmes for Germany as a whole;
- (e) currency and banking, central taxation and customs:
- (f) reparation and removal of industrial war potential:
- (g) transportation and communications.

In applying these policies account shall be taken, where appropriate, of varying local conditions.

15. Allied controls shall be imposed upon the Ger-

man economy but only to the extent necessary;

(a) To carry out programmes of industrial disarmament and demilitarization, of reparations, and of approved exports and imports.

(b) To assure the production and maintenance of goods and services required to meet the needs of the occupying forces and displaced persons in Germany and essential to maintain in Germany average living standards not exceeding the average of the standards of living of European countries. (European countries means all European countries excluding the United Kingdom and the Union of Soviet Socialist Republics.)

(c) To ensure in the manner determined by the Control Council the equitable distribution of essential commodities between the several zones so as to produce a balanced economy throughout Germany and reduce the need for

imports.

(d) To control German industry and all economic and financial international transactions, including exports and imports, with the aim of preventing Germany from developing a war potential and of achieving the other objectives named herein.

- (e) To control all German public or private scientific bodies, research and experimental bodies, research and experimental institutions, laboratories, etc., connected with economic activities.
- 16. In the imposition and maintenance of economic controls established by the Control Council, German administrative machinery shall be created and the German authorities shall be required to the fullest extent practicable to proclaim and assume administration of such controls. Thus it should be brought home to the German that the responsibility for the administration of such controls and any breakdown in these controls will rest with themselves. Any German controls which may run counter to the objectives of occupation will be prohibited.
 - 17. Measures shall be promptly taken:
 - (a) to effect essential repair of transport;

(b) to enlarge coal production;

(c) to maximise agricultural output;

- (d) to effect emergency repair of housing and essential utilities.
- 18. Appropriate steps shall be taken by the Control Council to exercise control and the power of disposition over German-owned external assets not already under the control of the United Nations which have taken part in the war against Germany.
- 19. Payment of Reparations should leave enough resources to enable the German people to subsist without external assistance. In working out the economic balance of Germany the necessary means must be provided to pay for imports approved by the Control Council in Germany. The proceeds of exports from current production and stocks shall be available in the first place for payment for such imports.

The above clause will not apply to the equipment and products referred to in paragraph 4 (a) and 4 (b)

of the Reparations Agreement.

IV.—REPARATIONS FROM GERMANY

In accordance with the Crimea decision that Germany be compelled to compensate to the greatest possible extent for the loss and suffering that she has caused to the United Nations and for which the German people cannot escape responsibility, the following agreement on reparations was reached:

1. Reparation claims of the U.S.S.R. shall be met by removals from the zone of Germany occupied by the U.S.S.R. and from appropriate German ex-

ternal assets.

2. The U.S.S.R. undertakes to settle the reparation claims of Poland from its own share of reparations.

3. The reparation claims of the United States, the United Kingdom and other countries entitled to reparations shall be met from the Western Zones and from appropriate German external assets.

4. In addition to the reparations to be taken by the U.S.S.R. from its own zone of occupation, the U.S.S.R. shall receive additionally from the Western

Zones:

(a) 15 per cent. of such usable and complete industrial capital equipment, in the first place from the metallurgical, chemical and machine manufacturing industries, as is unnecessary for the German peace economy and should be removed from the Western Zones of Germany, in exchange for an equivalent value of food, coal, potash, zinc, timber, clay products, petroleum products and such other commodities as may be agreed upon.

(b) 10 per cent. of such industrial capital equipment as is unnecessary for the German peace economy and should be removed from the Western Zones, to be transferred to the Soviet Government on reparations account without payment or exchange of any kind in return.

Removals of equipment as provided in (a) and (b)

above shall be made simultaneously.

5. The amount of equipment to be removed from the Western Zones on account of reparations must be determined within six months from now at the latest.

6. Removals of industrial capital equipment shall begin as soon as possible and shall be completed within two years from the determination specified in paragraph 5. The delivery of products covered by 4 (a) above shall begin as soon as possible and shall be made by the U.S.S.R. in agreed instalments within

five years of the date hereof.

The determination of the amount and character of the industrial capital equipment unnecessary for the German peace economy and therefore available for reparation shall be made by the Control Council under policies fixed by the Allied Commission on Reparations, with the participation of France, subject to the final approval of the Zone Commander in the Zone from which the equipment is to be removed.

7. Prior of the fixing of the total amount of equipment subject to removal, advance deliveries shall be made in respect of such equipment as will be determined to be eligible for delivery in accordance with the procedure set forth in the last sentence of para-

graph 6.

8. The Soviet Government renounces all claims in respect of reparations to shares of German enterprises which are located in the Western Zones of occupation in Germany as well as to German foreign assets in all countries except those specified in paragraph 9 below.

9. The Governments of the United Kingdom and United States of America renounce their claims in respect of reparations to shares of German enterprises which are located in the Eastern Zone of occupation in Germany, as well as to German foreign assets in Bulgaria, Finland, Hungary, Rumania and Eastern Austria.

10. The Soviet Government makes no claims to gold captured by the Allied troops in Germany.

V.—DISPOSAL OF THE GERMAN NAVY AND MERCHANT MARINE

The Conference agreed in principle upon arrangements for the use and disposal of the surrendered German fleet and merchant ships. It was decided that the three Governments would appoint experts to work out together detailed plans to give effect to the agreed principles. A further joint statement will be published simultaneously by the three Governments in due course.

VI.—CITY OF KOENIGSBERG AND THE ADJACENT AREA The Conference examined a proposal by the Soviet Government that, pending the final determination of territorial questions at the peace settlement, the section of the western frontier of the Union of Soviet Socialist Republics which is adjacent to the Baltic Sea should pass from a point on the eastern shore of the Bay of Danzig to the east, north of Braunsberg-Goldap, to the meeting point of the frontiers of Lithuania, the Polish Republic and East Prussia.

The Conference has agreed in principle to the proposal of the Soviet Government concerning the ultimate transfer to the Soviet Union of the city of Koenigsberg and the area adjacent to it as described above, subject to expert examination of the actual

The President of the United States and the British Prime Minister have declared that they will support the proposal of the Conference at the forthcoming peace settlement.

VII.—WAR CRIMINALS

The three Governments have taken note of the discussions which have been proceeding in recent weeks in London between British, United States, Soviet and French representatives with a view to reaching agreement on the methods of trial of those major war criminals whose crimes under the Moscow Declaration of October, 1943, have no particular geographical localization.

The three Governments reaffirm their intention to bring these criminals to swift and sure justice. They hope that the negotiations in London will result in speedy agreement being reached for this purpose, and they regard it as a matter of great importance that the trial of these major criminals should begin at the earliest possible date. The first list of defendants will be published before 1st September.

VIII.—AUSTRIA

The Conference examined a proposal by the Soviet Government on the extension of the authority of the Austrian Provisional Government to all of Austria.

The three Governments agreed that they were prepared to examine this question after the entry of the British and American forces into the city of Vienna.

IX.-POLAND

The Conference considered questions relating to the Polish Provisional Government and the western boundary of Poland.

A. On the Polish Provisional Government of National Unity they defined their attitude in the follow-

ing statement:

We have taken note with pleasure of the agreement reached among representative Poles from Poland and abroad which has made possible the formation, in accordance with the decisions reached at the Crimea Conference, of a Polish Provisional Government of National Unity recognized by the three Powers. The establishment by the British and United States Governments of diplomatic relations with the Polish Provisional Government has resulted in the withdrawal of their recognition from the former Polish Government in London, which no longer exists.

The British and United States Governments have taken measures to protect the interest of the Polish Provisional Government as the recognized Government of the Polish State in the property belonging to the Polish State located in their territories and under their control, whatever the form of this pro-

perty may be.

They have further taken measures to prevent alienation to third parties of such property. All proper facilities will be given to the Polish Provisional Government for the exercise of the ordinary legal remedies for the recovery of any property belonging to the Polish State which may have been wrongfully

The Three Powers are anxious to assist the Polish Provisional Government in facilitating the return to Poland as soon as practicable of all Poles abroad who wish to go, including members of the Polish Armed Forces and the Merchant Marine. They expect that those Poles who return home shall be accorded personal and property rights on the same basis as all Polish citizens.

The Three Powers note that the Polish Provisional Government, in accordance with the decisions of the Crimea Conference, has agreed to the holding of free and unfettered elections as soon as possible on the basis of universal suffrage and secret ballot in which all democratic and anti-Nazi parties shall have the right to take part and to put forward candidates, and that representatives of the Allied Press shall enjoy full freedom to report to the world upon developments in Poland before and during the elections.

B. The following agreement was reached on the western frontier of Poland:

In conformity with the agreement on Poland reached at the Crimea Conference the three Heads of Government have sought the opinion of the Polish Provisional Government of National Unity in regard to the accession of territory in the north and west, which Poland should receive.

The President of the National Council of Poland and members of the Polish Provisional Government of National Unity have been received at the Conference and have fully presented their views. The three Heads of Government reaffirm their opinion that the final delimitation of the western frontier of Poland

should await the peace settlement.

The three Heads of Government agree that, pending the final determination of Poland's western frontier the former German territories east of a line running from the Baltic Sea immediately west of Swinemunde, and thence along the Oder river to the confluence of the western Neisse river and along the western Neisse to the Czechoslovak frontier, including that portion of East Prussia not placed under the administration of the Union of Soviet Socialist Republics in accordance with the understanding reached at this conference and including the area of the former free city of Danzig, shall be under the administration of the Polish State and for such purposes should not be considered as part of the Soviet zone of occupation in Germany.

X.—Conclusion of Peace Treaties and Admission TO THE UNITED NATIONS ORGANIZATION

The Conference agreed upon the following statement of common policy for establishing as soon as psosible the conditions of lasting peace after victory in Europe.

The Three Governments consider it desirable that the present anomalous position of Italy, Bulgaria, Finland, Hungary and Rumania should be terminated by the conclusion of Peace Treaties. They trust that the other interested Allied Governments will share

these views.

For their part the Three Governments have included the preparation of a Peace Treaty for Italy as the first among the immediate important tasks to be undertaken by the new Council of Foreign Ministers. Italy was the first of the Axis Powers to break with Germany, to whose defeat she has made a material contribution, and has now joined with the Allies in the struggle against Japan.

Italy has freed herself from the Fascist régime and is making good progress towards the re-establish-



ment of a democratic Government and institutions. The conclusion of such a Peace Treaty with a recognized and democratic Italian Government will make it possible for the Three Governments to fulfil their desire to support an application from Italy for membership of the United Nations.

The Three Governments have also charged the

Council of Foreign Ministers with the task of preparing Peace Treaties for Bulgaria, Finland, Hungary

and Rumania.

The conclusion of Peace Treaties with recognized democratic Governments in these States will also enable the Three Governments to support applications from them for membership of the United Nations. The Three Governments agree to examine each separately in the near future, in the light of the conditions then prevailing, the establishment of diplomatic relations with Finland, Rumania, Bulgaria and Hungary to the extent possible prior to the conclusion of peace treaties with those countries.

The Three Governments have no doubt that, in view of the changed conditions resulting from the termination of the war in Europe, representatives of the Allied Press will enjoy full freedom to report to the world upon developments in Rumania, Bulgaria, Hungary and Finland.

As regards the admission of other States into the United Nations Organization, Article 4 of the Char-

ter of the United Nations declares that:
"1. Membership in the United Nations is open to all other peace-loving States who accept the obligations contained in the present Charter and, in the judgment of the organization, are able and willing to

carry out those obligations.

"2. The admission of any such State to membership in the United Nations will be effective by a decision of the General Assembly upon the recom-

mendation of the Security Council.'

The Three Governments, so far as they are concerned, will support applications for membership from those States which have remained neutral during the war and which fulfil the qualifications set out above.

The Three Governments feel bound, however, to make it clear that they for their part would not favour any application for membership put forward by the present Spanish Government, which, having been founded with the support of the Axis Powers, does not, in view of its origins, its nature, its record and its close association with the aggressor States, possess the qualifications necessary to justify such membership.

XI.—TERRITORIAL TRUSTEESHIP

The Conference examined a proposal by the Soviet Government concerning trusteeship territories as defined in the decision of the Crimea Conference and in the Charter of the United Nations Organization.

After an exchange of views on this question it was decided that the disposition of any former Italian territories was one to be decided in connection with the preparation of a peace treaty with Italy and that the question of Italian territory would be considered by the September Council of Ministers of Foreign Affairs.

XII.—REVISED ALLIED CONTROL COMMISSION PRO-CEDURE IN RUMANIA, BULGARIA AND HUNGARY

The Three Governments took note that the Soviet representatives on the Allied Control Commissions in Rumania, Bulgaria and Hungary, have communicated to their United Kingdom and United States colleagues proposals for improving the work of the Control Commissions, now that hostilities in Europe have ceased.

The Three Governments agreed that the revision of the procedures of the Allied Control Commissions in these countries would now be undertaken, taking into account the interests and responsibilities of the Three Governments which together presented the terms of armistice to the respective countries, and accepting as a basis, the agreed proposals.

XIII.—ORDERLY TRANSFERS OF GERMAN POPULATIONS

The Conference reached the following agreement on the removal of Germans from Poland, Czechoslovakia and Hungary.

The Three Governments, having considered the question in all its aspects, recognize that the transfer to Germany of German populations or elements thereof remaining in Poland, Czechoslovakia and Hungary, will have to be undertaken. They agree that any transfers that take place should be effected in

an orderly and humane manner.

Since the influx of a large number of Germans into Germany would increase the burden already resting on the occupying authorities, they consider that the Allied Control Council in Germany should in the first instance examine the problem with special regard to the question of the equitable distribution of these Germans among the several zones of occupation.

They are accordingly instructing their respective representatives on the Control Council to report to their Governments as soon as possible the extent to which such persons have already entered Germany from Poland, Czechoslovakia and Hungary, and to submit an estimate of the time and rate at which further transfers could be carried out, having regard to the present situation in Germany.

The Czechoslovak Government, the Polish Provisional Government and the Control Council in Hungary are at the same time being informed of the above, and are being requested meanwhile to suspend further expulsions pending the examination by the Governments concerned of the report from their representatives on the Control Council.

XIV.-MILITARY TALKS

During the Conference there were meetings between the Chiefs of Staff of the three Governments on military matters of common interest.

APPROVED:

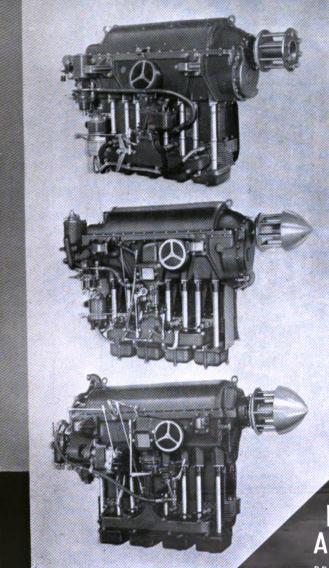
J. V. STALIN. HARRY S. TRUMAN. C. R. ATTLEE.

Berlin, 2nd August, 1945.

Printed and Published in Great Britain by GALE & POLDEN Ltd., Wellington Works, Aldershot. Overseas Agents, INDIA: Thacker, Spink & Co., Calcutta and Simia. Thacker & Co., Ltd., Bombay. Hiodingothams, Ltd., Madras and Bangalore. CANADA: Wm. Dawson Sussexiption Service, Ltd., 70, King Street East, Toronto, 2 Canada. AUSTRALIA and NEW ZEALAND: Anous & Robertson, Ltd. SOUTH AFRICA: W. Dawson and Son (S.A.) Ltd., 29 and 31, Long Street, Capetown.



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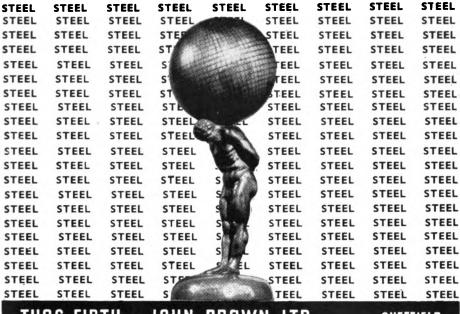
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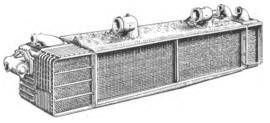
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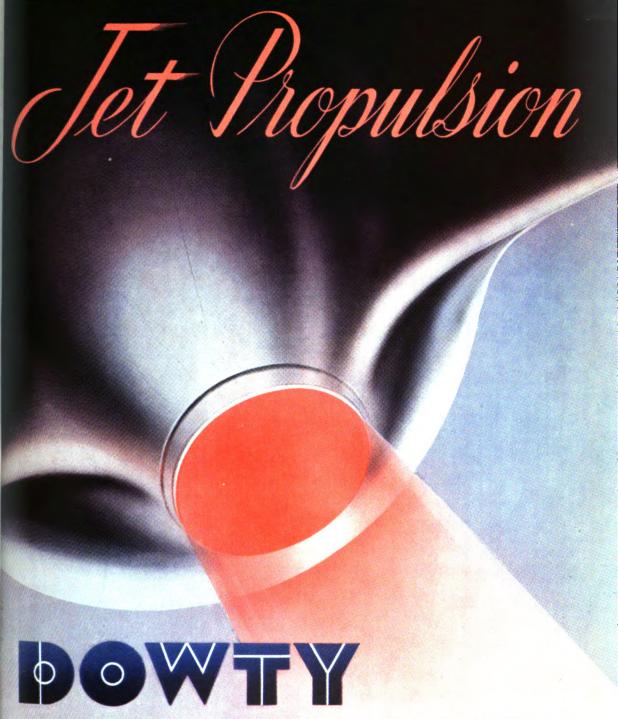
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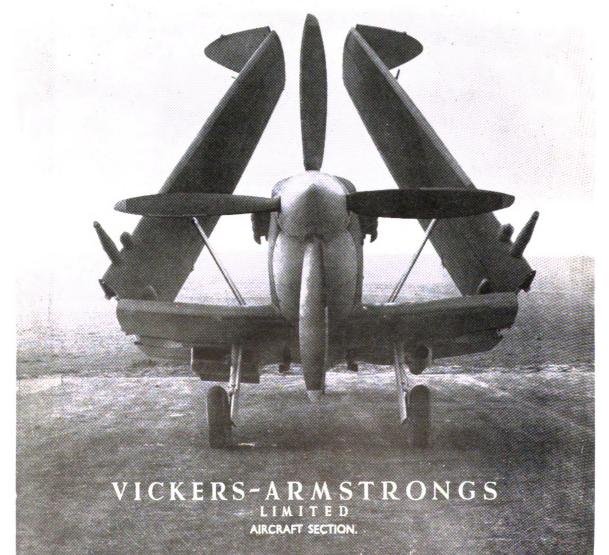
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THE ROYAL AIR FORCE QUARTERLY

Embodying also the Royal Australian Air Force, Royal Canadian Air Force, Royal New Zealand Air Force, South African Air Force and Royal Indian Air Force

EDITOR:

WING COMMANDER C. G. BURGE, O.B.E., q.s., R.A.F. (Retd.)

Assisted by an Advisory Committee of Members of the R.A.F. and Air Forces of the Dominions

VOLUME XVII

DECEMBER, 1945

NUMBER 1

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The Royal Air Force Staff College is experincing extreme difficulty in obtaining printed iterature suitable for their Reference Libraries. It is thought that there are many officers (serving and retired) still in the possession of books, locuments and publications who are no longer in need of them and who will be anxious to elp in meeting these pressing needs. Officers' Messes also will wish to contribute.

Reading matter on the following subjects yould be especially appreciated: Historical, trategical and Technical Development of Air lower; Biographies; Military, Naval and Polical Histories; Economics; Psychology and, articularly, written and spoken English and lassice

Contribution need not invariably be of the lature of an outright gift. Donations of his-

torical value could be retained for the reference and convenience only of students and would be available for return to their owners immediately on request. There are indeed circumstances in which it would conceivably be to the owners' advantage to have their books cared for under these conditions.

Correspondence on this subject should be addressed to the Librarian, Royal Air Force Staff College, Bracknell, Berks, enclosing a list of the books it is proposed to donate or lend.

R.A.F. Post-War Association

Plans have just been made to form a Post-War Association of R.A.F. Officers who served in the Mediterranean or Middle East Commands during the war.

Named the "Headquarters R.A.F. Mediterranean Association," membership is open to all R.A.F. and W.A.A.F. officers, officers of the



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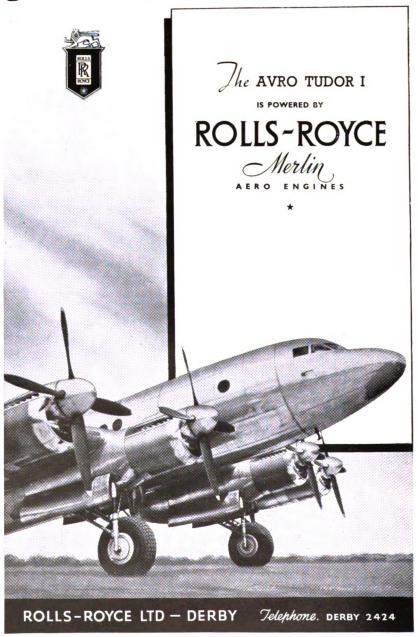
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Dominion Air Forces, and Army officers who were on the posted strength of Eastern Air Command, Mediterranean Air Command, North West African Air Force, Mediterranean Allied Air Forces, or Mediterranean-Middle East Command at any time up to 15th October this year.

Marshal of the Royal Air Force Sir Arthur Tedder, Air Marshal Sir John Slesser and Air Marshal Sir Guy Garrod, all intimately connected with the R.A.F. in the Mediterranean and Middle East during the war, have been invited to become patrons of the Association.

Already, arrangements are in hand for a first reunion dinner. It will probably be held in London next May, on the Saturday after V-Day. It should be a novel experience when members try to recognize one another "out of uniform." Lounge suits will be the dress worn.

It is hoped to send a notice of the formation of the Association to all officers who have now left the theatre and were in any of the Commands mentioned, but application for membership can be made to Squadron Leader M. R. E. Swanwick, Whittington House, Old Whittington, Chesterfield, England.

The memorial subscription of 5s. to provide

for initial expenses should be enclosed.

R.A.F. Benevolent Fund

The amounts donated to this Fund for the quarter ended 1st December, 1945, are given below:

R.A.F. QUARTERLY donation, December, 1945, quarter ... 22 6

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EDITORIAL

In Parliament

I.—GOVERNMENT POLICY

THE KING'S SPEECH

In accordance with long-established parliamentary practice, the King's Speech, delivered at the opening of a new parliament, contains an outline of the programme of legislation which the government proposes for the coming session. And because the present government has assumed office with such a clear mandate from the electorate to put into practice some at least of those principles for which the party stands and with which it went to the polls, the speech which His Majesty was graciously pleased to make from the Throne to members of both Houses of Parliament on Wednesday, 15th August, 1945 (the day on which, by a happy coincidence, the victorious termination of the war against Japan was announced), is especially interesting and significant. The main lines of government policy then, as foreshadowed in the King's Speech, are these:

1. Ratification of the Charter of the United Nations* and co-operation with that organiza-

*This has since been done, and the Charter of the United Nations, in the words of Mr. Byrnes, Secretary of State of the U.S.A., "is now a part of the law of Nations," having been ratified by all the five leading Powers and by a majority (twenty-four, so far) of the other nations represented at San Francisco, including Poland. tion in the maintenance of peace, in accordance with justice and respect for human rights, and in promoting the welfare of all peoples.

2. The occupation, by our armed forces, of enemy countries for so long as may be considered necessary; and clearing the seas of mines.

3. The care, and restoration to their homes, of all prisoners-of-war in Japanese hands.

4. The orderly release of men and women from the armed forces, on the basis of plans announced in the autumn of 1944, and their resettlement in civil life.

5. The efficient employment of the national resources in labour and material in the interests of all, and progressive improvement in the standard of living.

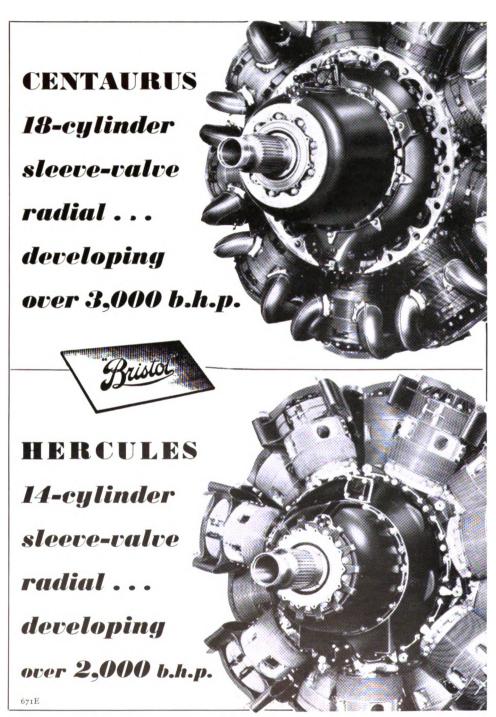
6. The reconversion of industry from a war to a peace basis; and the expansion of our export trade.

7. To secure, by suitable control or by an extension of public ownership, that our industries and services shall make their maximum contribution to the national well-being.

8. To bring the Bank of England under public ownership; and the effective planning of investment.

9. The nationalization of the coal-mining industry as part of a concerted plan for the co-ordination of the fuel and power industries.

10. The maintenance of the controls necessary to ensure, during the period of transition



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from war to peace, the right use of our commercial and industrial resources and the distribution, at fair prices, of essential supplies and services.

11. The increase, by all practicable means, of the number of homes available both in town

and country.

- 12. The provision of a comprehensive scheme of insurance against industrial injury; the extension and improvement of the existing scheme of social insurance; and the establishment of a national health service.
- 13. The repeal of the Trade Disputes and Trade Unions Act.
- 14. The development of the home production of good food, and the promotion of a healthy fishing industry.
 - 15. The reorganization of air transport.
- 16. To bring into practical effect, at the earliest possible date, the educational reforms already approved (Education Act, 1944).
- 17. Close consultation with the governments of the self-governing Dominions on all matters of mutual concern.
- 18. The early realization of full self-government in India.
- 19. The continued development of our Colonial Empire, and the welfare of all its peoples.

II.—E.V.T. IN THE R.A.F.

In reply to a question by Mr. Quintin Hogg, member for Oxford, on 10th October, 1945, the Under-Secretary of State for Air, Wing Commander Strachey, said in the House of Commons that the E.V.T. Scheme in the R.A.F. was now beginning to get under way and that some 600,000 airmen and airwomen (about 65 per cent. of the total strength of the R.A.F.) wanted to make use of the E.V.T. Scheme in one way or another. In addition to education officers, some 9,000 full-time instructors had been trained and many part-time instructors were being used. About 200,000 students in Home Commands, he said, had actually begun work under the E.V.T. Scheme, and a considerable (but not yet ascertained) number in Overseas Commands. Provision was made for training in citizenship, for improving a man's or a woman's standard of basic education, for helping him or her to prepare for university and professional examinations, and for technical instruction in trades. A man might learn a new trade or take a course whereby he could adapt his skill and knowledge in an R.A.F. trade to the corresponding civilian trade. "This side of the work," he said, "is carried on in consultation with

the Ministry of Labour . . . but . . . E.V.T. can carry with it no guarantee of employment in the particular trade selected." In reply to further questions, Wing Commander Strachey said that the E.V.T. Scheme had now been extended to a "fairly comprehensive list" of trades; and he agreed that airmen and airwomen in the higher age and service groups, e.g., the 60's and 70's, should be allowed to begin E.V.T. at once, but shortages of books, material and equipment were delaying their start.

III.—BALLOON COMMAND'S BAG, 1939-45

The Under-Secretary of State for Air stated in the House of Commons on 10th October, 1945, in answer to a question by Wing Commander Hulbert, that twenty-four piloted and 278 non-piloted aircraft were destroyed by Balloon Command between 1939 and 1945.

IV.—THE COUNCIL OF FOREIGN MINISTERS

On 9th October, 1945, the Secretary of State for Foreign Affairs (Mr. Ernest Bevin) made a statement in the House of Commons reporting and explaining the breakdown that had occurred in the Council of Foreign Ministers which began its meetings in London on 11th September and was adjourned sine die on 2nd October. The public were already well aware of the breakdown and curious as to the reasons; but Mr. Bevin, out of deference to the House, had deliberately refrained from making any public statement until the House met after the recess. The facts are these:

At the opening meeting of the Council, a resolution was adopted to the effect that all five members (i.e., the representatives of the U.K., the U.S.A., the U.S.S.R., China and France) should attend all meetings and, if they so desired, take part in all discussions; but that decisions should be taken only by the delegations representing the governments which were, or were deemed to be, signatories of the relevant terms of surrender. The resolution was adopted unanimously, as being a true interpretation of the Council's terms of reference as laid down in the protocol of the Berlin Conference. Upon this basis of agreement on procedure, the Council worked hard for ten days and made considerable progress in laying down the general principles upon which the peace treaties with Finland and Italy should be drafted, and was beginning work upon the treaties with Rumania and Bulgaria. Here some serious divergence of views between the delegations of the U.S.A. and the U.S.S.R. became apparent, turning on the recognition of the governments of those countries as then constituted.

At this juncture, on 22nd September, Mr. Molotov, representing the government of the U.S.S.R., suddenly surprised the other members of the Council by announcing that he could not agree to continue discussions on the peace treaties under the procedure under which they had been working for ten days; because, in his view and in the view of his government, they had all been violating the terms of the Berlin Agreement. What he wanted was that members of the Council should not be allowed to be present at the discussions on treaties with defeated powers unless their governments had been, or were deemed to have been, signatories of the relevant terms of surrender. Both Mr. Bevin and Mr. Byrnes (the latter representing the U.S.A.) urged Mr. Molotov to reconsider his decision and to adopt the wider interpretation upon which they had all agreed at the first meeting of the Council; but he would not give way. In this impasse, reference was made to the three governments concerned, and each government supported its own representative. Subsequently it transpired that Mr. Molotov, in making his startling announcement on 22nd September, was acting under orders from Moscow. Here it may be pointed out that the Berlin Agreement, which initiated and authorized the Council of Foreign Ministers, clearly lays down that the first duty of the Council is to draw up peace treaties with Italy, Rumania, Bulgaria, Hungary and Finland, and also that all members, whether signatories of the relevant terms of surrender or not, are to be invited to participate in the discussion of matters in which they are directly concerned. In this connection, it is significant that the French Government had represented that it was interested in all settlements in Europe. If the desire of the U.S.S.R. were fulfilled, then France and China would both be excluded from discussions on the treaties with the Balkan countries, and the U.S.A. from discussions on the treaty with Finland. This was repugnant to Mr. Bevin and to Mr. Byrnes, both of whom had the support of their governments.

Nor were these the only difficulties. When it came to trying to agree upon what had already been done, Mr. Molotov again insisted on applying the same principle. He refused to put his name to any comprehensive report upon the proceedings and demanded that four separate reports should be issued: one on

general questions, to be signed by all five members; one on the treaty with Italy, to be signed by the representatives of the U.S.A., U.S.S.R., U.K. and France; one on the treaties with Rumania and Bulgaria, to be signed by the representatives of the U.S.A., U.S.S.R. and U.K.; and one on the treaty with Finland, to be signed by the U.S.S.R. and U.K. To this Mr. Bevin and Mr. Byrnes reluctantly agreed; but then Mr. Molotov said that he could not sign any protocol until the decision taken on 11th September (allowing all interested parties to take part in discussions) had been struck out of the record of the proceedings. To this Mr. Bevin and Mr. Byrnes did not agree; as it would not have truly represented the facts. and was moreover, with them, a matter of principle—the same principle as that which lies behind the Charter of the United Nations, namely, that the five Great Powers are jointly responsible for the maintenance of peace upon a foundation of justice and equity. And so the Council quietly broke up, though not, it is presumed, finally. There was, in fact, an immediate exchange of notes between Mr. Bevin and Mr. Molotov, in which each affirmed his confidence that agreement would be reached at some future time.

And now, to use a colloquial phrase, how do we stand? The word "deadlock" has been frequently used. It is not the right word. Mr. Bevin expressly said in the House that there was no deadlock. The parties came to a point upon which they could not agree; and as agreement upon that point was necessary before further progress could be made, they did the only thing possible—they postponed further discussions, which will presumably be resumed when circumstances are more favourable.

Russia is an ancient country. It has centuries of tradition and of international experience behind it. But its present government is comparatively young. It may well be that, as in the youth of individuals so in the youth of governments, there is a phase when they think the world is their oyster to be prised open without regard to its feelings. Doubtless with the wisdom that comes of delay, the government of the U.S.S.R. will soon be prepared to give as well as to take, realizing that compromise is the key to the satisfactory settlement of all disputes, both personal and international. Meanwhile the firm stand taken by Mr. Bevin and Mr. Byrnes, supported by their respective governments, upon the principle, already agreed upon at San Francisco, that the five Great Powers are jointly responsible for maintaining the peace of the world and must there-



TITANINE LIMITED COLINDALE LONDON N.W.9 TELEPHONE COLINDALE 8123 LICENSEES IN CANADA: INTERNATIONAL PAINTS (CANADA) LTD., 6700 PARK AVENUE, MONTREAL fore all be heard when peace treaties are being discussed, is a matter of some satisfaction and consolation.

We would not, however, wish it to be believed that Russia's conduct in this matter was purely arbitrary. On the contrary, Mr. Molotov's action was obviously the result of much careful deliberation on his part and on the part of his government; but it can be understood only when it is realized how difficult it is to establish the necessary degree of mutual understanding and sympathy between Russia and the Western Powers. This difficulty is caused not by any lack of desire or goodwill on either side, but by differences of language, of tradition and of outlook.

The Russians and the Western Powers do not see things in the same way. Hence fear and suspicion are bred on both sides, for it is natural to fear what one does not understand. The Russia of to-day is desperately anxious to ensure her security. She fears aggression from the West; and not without reason. She has been invaded by the Poles and the Swedes in the 16th and 17th centuries, by the French under Napoleon, by the Germans twice (in 1914 and 1941), by the victorious allies in 1919 and by the Poles again in 1920. Russia regards the small countries on her Western border much as we regard the Low Countries, as buffer states between ourselves and a possibly hostile continental power; and she resents interference in their political affairs by anyone but herself. Russia also holds, with some justification, that only those powers that can support their policies with adequate force should determine international questions of major importance; and that may account for her objection to France and China participating in discussions about the Balkans.

Again, the word "democracy" has a very different meaning in Russian ears and in the ears of the British and Americans; and that may account for the difference of opinion about the democratic nature of the Bulgarian and Rumanian governments. Furthermore, they cannot understand why we should be so critical of forms of government in those two countries when we (the British and Americans) can apply no sanctions there, while we shut our eyes to undemocratic governments in places where we could step in and change them.

Russia has declared that she has no desire to interfere in any region essential to British and American security; and there is really no reason to doubt her good faith in this. She is surely therefore entitled to ask the British and Americans to give her a free hand in countries essential to her own security.

The main differences between Russia and the Western Powers is not one of ideologies—Capitalism versus Communism. It is merely one of security. Each party rightly desires, and is rightly trying to provide, security for itself. If this be recognized, there is no reason whatever why agreement should not soon be reached.

V.—DEMOBILIZATION

Speaking in the debate on Demobilization in the House of Commons on 22nd October, Mr. Churchill dealt with "our commitments—that is, the military necessities." He submitted what he thought should be the strength of the United Kingdom Armed Forces, "which we should aim to reach with all possible speed." Taking the Navy first, he had yet to hear any argument which justified our planning to maintain. or maintaining, at the present time—unless it were in connection with the Fleet Air Arma larger naval force in personnel than we had at the beginning of the late war, namely. 133,000. Dealing next with the Royal Air Force, he considered "that the permanent Royal Air Force must be maintained on a very large scale, and in magnificent quality, with the very latest machines, and that they should become the prime factor in our island and Imperial defence." He continued: "I may say I had thought that 150 to 200 combatant squadrons, with the necessary training establishments, and, of course, with the large auxiliary reserves which can be developed, should be our staple. This would involve about 4.000 machines under constant construction, the auxiliary forces being additional." He yielded to none in his desire to see preserved this splendid weapon of the Royal Air Force, upon which our safety and our freedom depended.

VI.—RELEASES FROM THE ROYAL AIR FORCE

Some questions were asked in the House of Commons by three private members on 12th October, 1945, concerning the arrangements for the release of R.A.F. personnel as announced by the Ministry of Labour; and in particular, concerning the fact that in June. 1946, the Royal Navy will have reached Release Group 45, the Army Release Group 31, and the Royal Air Force will have reached only Release Group 28. This appeared, they said to be a serious departure from the "age-plus-length-of-service" principle, and they asked for explanations.

In reply, the Under-Secretary of State for

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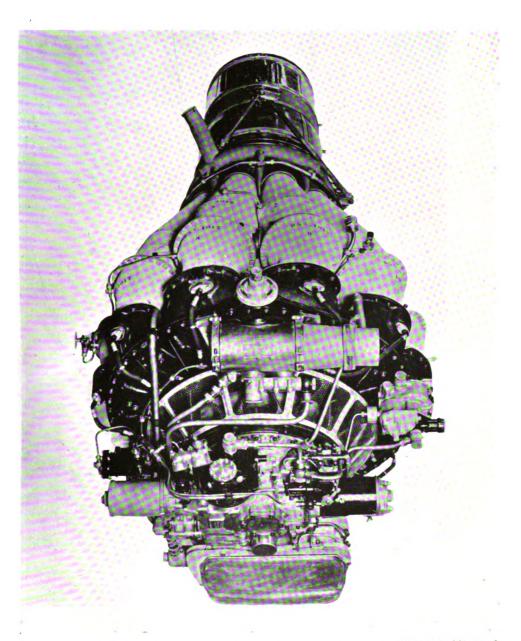
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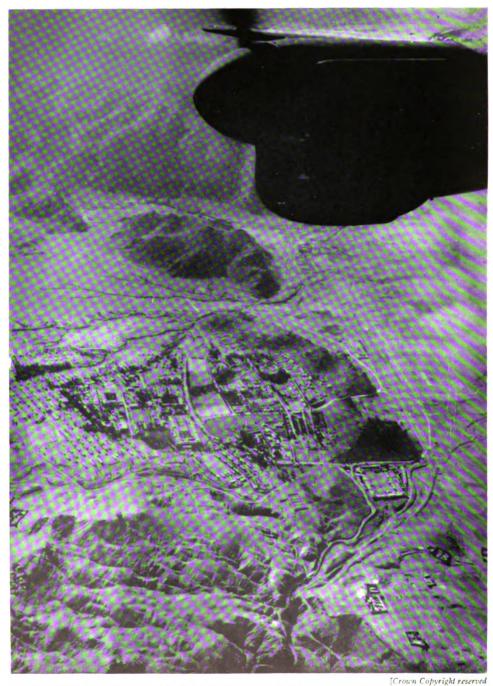
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Air, Mr. Strachey, made statements to the fol-

lowing effect:

1. A truer comparison is given by the reductions in the strengths of the three Services, based on their strengths on VE Day. By midsummer, 1946, according to present plans, the Royal Navy will have been reduced to 52 per cent. of its VE Day strength, the Army to 36 per cent, and the Royal Air Force to 58 per cent.

- 2. Release is not a separate operation by each Service working independently of the others, but is a planned scheme in which each of the three Services depends upon the other two.
- 3. This was the only way to achieve the government's two obligations: (a) to meet our world-wide commitments and (b) to get one and a half million men out by Christmas and three million out by midsummer next.
- 4. This involved retaining relatively large air forces and relatively small ground forces; and was an application of the principle, already established, that it is far more economical in manpower to occupy and police a country by air forces than by ground forces. That is why the Army is to be reduced to 36 per cent. of its VE Day strength by 30th June, 1946, while the R.A.F. is to be reduced only to 58 per cent.
- 5. Again, in applying the "age-and-length-of-service" principle equally to men at home and overseas, the task of bringing home men from all over the world falls heavily upon the R.A.F., who will be called upon to transport no less than one million men and women between now and 30th June, 1946; and the flying and maintenance of troop-carrying aircraft demands skilled and experienced men. That is why 58 per cent. of the VE-Day strength of the R.A.F. is to be retained until next summer as compared with 52 per cent. of the Royal Navy's VE-Day strength.
- 6. There is a possibility that the political and military situation in the world as a whole may change for the better during the next nine months, and this may make possible an acceleration in the rate of release in the R.A.F. Also, if the shipping position is better, as it seems likely to be in the new year, then more troops and others will be transported by sea and fewer by air; and that will enable releases from the R.A.F. to be accelerated.
- 7. But whatever revision is made, a heavy burden must inevitably fall on members of the R.A.F. and W.A.A.F., who are called upon to play a very large part in our occupying and policing forces and in transporting home their comrades in the other two Services.

World Affairs

I.—AMERICAN FOREIGN POLICY

In a proclamation, said to be "his most important address since he took office," President Truman, on 27th October, 1945, announced to the American people and to the world the twelve points of American foreign policy. They are these:

"1. We seek no territorial expansion or selfish advantage. We have no plans for aggression against any other State, large or small. We have no objective which need clash with the

peaceful aims of any other nation.

"2. We believe in the eventual return of sovereign rights and self-government to all peoples who have been deprived of them by force.

"3. We shall approve no territorial changes in any friendly part of the world unless they accord with the freely expressed wishes of the

people concerned.

"4. We believe that all peoples who are prepared for self-government should be permitted to choose their own form of government by their own freely expressed choice without interference from any foreign source. This is true in Europe, in Asia, and in Africa, as well as in the Western Hemisphere.

"5. In co-operative action with our war allies, we shall help the defeated enemy States to establish peaceful democratic governments of their own free choice, and we shall try to attain a world in which Nazism, Fascism, and

military aggression cannot exist.

"6. We shall refuse to recognize any government imposed on any nation by the force of any foreign Power. In some cases it may be impossible to prevent the forceful imposition of such government, but the U.S. will not recognize any such government.

"7. We believe that all nations should have the freedom of the seas and of rivers and waterways which pass through more than one country.

"8. We believe that all States which are accepted in the society of nations should have access to the trade and raw materials of the world.

"9. We believe that the Sovereign States of the Western Hemisphere, without interference from outside the hemisphere, must work together as good neighbours in the solution of their common problems.

"10. We believe that full economic collaboration between all nations, great and small, is essential for the improvement of living conditions all over the world and the establishment of freedom from fear and freedom from want. "11. We shall continue to strive to promote freedom of expression and freedom of religion throughout the peace-loving areas of the world.

"12. We are convinced that the preservation of peace between the nations requires a United Nations Organization composed of all the peace-loving nations of the world who are willing jointly to use force if necessary to ensure peace."

President Truman also enunciated four reasons why America must maintain powerful

armed forces. They are:

"First, our Army, Navy and Air Force, in collaboration with our Allies, must enforce the terms of the peace imposed upon our defeated enemies.

"Secondly, we must fulfil the military obligations which we undertake as a member of the United Nations' Organization—to support lasting peace by force if necessary.

"Thirdly, we must co-operate with other American nations to preserve the territorial integrity and political independence of the nations

of the Western Hemisphere.

"Fourthly, in this troubled and uncertain world our military forces must be adequate to discharge the fundamental mission laid upon them by the Constitution of the United States—to 'provide for the common defence' of the United States."

Some of the twelve points of foreign policy. are perhaps more in the nature of pious hopes. They are none the worse for that. Even if they cannot be realized either wholly or quickly, they remain ideals worthy of the highest statesmanship. But it is difficult for the leader of a politically advanced nation, such as the United States of America, to understand the outlook of politically backward nations, of which there are many even in Europe; it is still more difficult for him to prescribe what form of government will suit them; and it is quite impossible for him to induce them to adopt it, unless they are willing. When, however, he speaks of armaments and world security, he is indeed coming down to brass tacks. These are things everyone can understand. Whether peace can ever be long maintained by force is a debatable question; but everyone realizes the influence of armed forces, and there are few who will put their trust entirely in goodwill or any other spiritual influence when it comes to international affairs.

The twelve points of American foreign policy and the four reasons for maintaining armed forces might well be adopted, in principle at least, by every great and medium power in the world; and even the smaller powers would, we think, do well to adopt as many of the points as can be applied to them. We are grateful to the American President for so precisely defining his country's ideals. As for ourselves, it has never been the practice of the government of the United Kingdom to announce its foreign policy in such precise detail. The foreign policy of the present government, as detailed in the King's Speech on 15th August, 1945, can be summed up as support of the United Nations in the maintenance of peace based on justice and liberty, the promotion of the welfare of all peoples, and the temporary occupation of enemy territory.

There is much to be said for an open declaration of foreign policy. It has been alleged that if Sir Edward Grey had been more frank, explicit and definite in 1914 the First World War would not have taken place—then; and that if Mr. Neville Chamberlain had been more frank, explicit and definite in 1938 and 1939, the Second World War would not have taken place—then. But there were many excellent reasons why both these statesmen took the line they did—reasons far too numerous and complicated to be quoted here, reasons with which all students of British foreign policy since 1900 are familiar. Furthermore, it is a peculiarly British habit not to declare a detailed foreign policy in advance, but to be guided by circumstances as they arise and to apply to them certain principles, not generally contained in any official proclamation or document but well understood by those whose duty it is to apply them.

There are, on the other hand, excellent reasons why the U.S.A. should have made this public and precise declaration through the mouth of her President; and perhaps the most important of these reasons is this. At the present time, suspicions have arisen among other nations, and even among her own people, that the U.S.A. might be contemplating taking refuge once more behind the Monroe Doctrine and, as she did after the First World War, cut herself away from all European political affairs, to the great disadvantage of Europe and of the world. President Truman's statesmanlike declaration has dispelled these suspicions and has, at the same time, given a lead and a challenge, both to his own people and to the rest of the world, to renew their faith in the absolute value and ultimate triumph of right.

II.—PALESTINE'S TRAGEDY

The tragedy of Palestine—for the present situation in Palestine is literally tragic, it being a conflict of right against right—demands the

sympathy of the whole world. On the one hand we have the Arabs, whose occupation of the country goes back for thousands of years with varying degrees of dependence and independence. On the other hand we have the Jews, who once owned and ruled the country "by divine right" as they then thought and still think, and who, since the collapse of their autonomous state, have been without a country yet have preserved throughout the world their racial characteristics. And to make the Jewish case more pitiful, they have recently been the subjects of cruel persecution in, and expulsion from, some of the countries, particularly in Eastern Europe, in which they have made their homes. Yet that should not be allowed to add weight in the scales against the claims of the Arabs, who are no more responsible for persecutions of the Jews than are any other peoples.

The problem is complicated by the fact that the British Government has from time to time, through different government departments, given to the Jews and to the Arabs promises, whether expressed or implied, which some say are contradictory and cannot therefore all be fulfilled. That is a doubtful allegation. The terms of the "Hogarth Message" and of the "McMahon Correspondence" are rather vague, and the latter may or may not have been intended to apply to Palestine; but there is little doubt that the Arabs, to whom it was addressed, thought at the time that it did apply to Palestine. Of course, the legal force of a document is determined by its words, or by the interpretation put upon them by impartial and authorized interpreters such as judges and arbitrators. But that satisfies only legalists and the party that benefits. It does not at all reduce the sense of grievance felt by the other party.

A further complication arises from the fact that the Jew and the Arab are so different in temperament. The Jew is thrifty, hard-working and progressive; the Arab is unthrifty, lazy and unprogressive. It is true that the Arab has profited by Jewish enterprise. He would have been a fool not to. But he did not ask to have his standard of life raised, and would have been quite content to remain as he was. One thing, however, Jews and Arabs have in common: they are intensely nationalistic. The Jews would be content to share Palestine with the Arabs provided that they (the Jews) governed and administered the country; but the Arabs are not prepared to share Palestine with the Jews, if the latter are allowed unlimited immigration, because they have a well-founded fear that the Jews would soon seize the government and give the Arabs practically no voice in the

administration of the country.

How this question can be settled we do not pretend to know; but that it is becoming increasingly urgent is obvious. Major-General Sir Edward Spears, who was British Minister to Syria and the Lebanon from 1942 to 1944, is strongly in favour of the policy outlined in the White Paper of 1939, which followed closely the finding of the Maugham Committee. Its main provisions were:

(a) It limited Jewish immigration to 75,000 in the following five years, and thereafter it was to be dependent on Arab consent.

(b) It restricted further sales of Arab land to Jews except in 5 per cent. of the country.

(c) His Majesty's Government undertook to do everything in their power to enable Palestine to become an independent State within ten years (i.e., by 1949).

years (i.e., by 1949).

"Scrutator," of the Sunday Times, suggests a joint government of the whole country by Jews and Arabs on a fifty-fifty basis, whatever may be the proportion between Jews and Arabs in the population at any time. This appears to be a workable solution, though it seems to have no precedent. With goodwill on both sides, Jews and Arabs, who are both Semitic and have common ancestors, may thus find some way of living together in unity.

III.—THE ATOMIC BOMB—AND AFTER

The possible effects that may follow the development of the use of atomic (or nuclear) energy were debated by the House of Lords for two-and-a-half hours on the afternoon of Tuesday, 16th October, 1945. The Earl of Darnley called their Lordships' attention "to the crisis in human affairs created by the atomic bomb and its future developments," and asked them to consider the following ultimatums that it has presented:

- 1. That a third world war, or even an attempt to stop war by force, may disintegrate humanity beyond repair and possibly even the globe that it inhabits;
- 2. That it will be impracticable if not impossible to keep the secrets of this weapon and its successors, to maintain adequate supervision of its manufacture, or to foresee or to prevent its use; and
- 3. Therefore every variation of the idea of force as a peace-maker has become obsolete and the only hope for continued existence in a tolerable form lies in the creation of a common front, composed of every nation, based on

the hope of abolition by general co-operation of past, present and future grievances, and adjustment by common consent of unfair variations in the availability of the necessaries of life.

And he called upon them "to ask His Majesty's Government if they will adopt this point of view and advance its urgency to United Nations in order that the co-operative and beneficial provisions of the Charter may have a proper chance of success and not be annulled by the useless and out-of-date methods 'of peace by force' now occupying such a prominent place in the mandate of the Security Council."

In the course of his speech the noble Earl said that it was perhaps "an even chance against the world being blown up in the next generation by some so-called patriotic scientist" and he asked "What is the world going to do about it?"

He urged that the uses of force as a creator of peace were quite useless and out-of-date; and that it would be quite impossible to keep the secrets of the new weapon (the atomic bomb) from the rest of the world or even to prevent its manufacture anywhere; and that there could be no effective defence against it because of its enormous destructive power and the impossibility of foretelling the time or manner of its approach. To hold up peace and prosperity in one hand and the atomic bomb in the other was the acme of paradox. The United Nations Charter contained many excellent provisions for the betterment of the lot of humanity; but they all risked failure so long as the idea prevailed that peace could be compelled by force—an idea that had been discredited through thousands of years of trial. Nations, in their own minds, were always right and would not submit to the jurisdiction of force, which invariably produced grievances and the desire for revenge and restitution. Even apart from the new weapon, the use of force had been discredited, as witness the appalling results of six years of war in Europe. He said that the next aggressor would develop his new weapon in secret somewhere and launch it with deadly effect; and it was quite possible that, by some miscalculation of the scientists, the bombs would not only destroy their target but also cause the whole world to disintegrate. And he pictured a second Milky Way "composed of the particles of politicians . . . blinking and winking their vituperation of each other and their own lack of blame in their own recently disintegrated spheres." But, he continued, the only way to avoid the use of force, whether

atomic or ordinary, would be to redistribute the necessaries of life on an equitable basis so as to eliminate grievances and injustices. Then and then only could the newly discovered atomic energy be used for the benefit of mankind.

Lord Cherwell, a distinguished physicist, then sought to reassure the Earl of Darnley by showing that fears for the disintegration of the world by the release of atomic energy ("nuclear fission," he said, was the proper technical term) were groundless. A full report of his speech appears elsewhere in this number of R.A.F. QUARTERLY. His arguments were:

Nuclear energy is set free by the disintegration of the heaviest elements, e.g., iron and copper, and these are at the same time the most stable. The lighter and less stable elements, on disintegration, absorb energy. Nuclear explosion takes place only when one nucleus starts off two, two start off four, and so on in geometrical progression; and the original nuclear detonation is as the match which starts a fire. Nuclear detonation and explosion is only possible among the heaviest elements. Now the heavy elements form only 1 per cent. of the material of the surface of the globe; and the remaining 99 per cent. consists of light elements from which no power can be produced by nuclear fission. Energy can only be produced from these latter by causing them to coalesce, which is far more difficult than causing them to disintegrate and could not happen accidentally over a large area.

Having shown that there was no scientific basis for the fear that nuclear fission might accidentally destroy the world, Lord Cherwell proceeded to explain that popular ideas of the benefits to be expected from it were greatly exaggerated. The only utilizable form of energy to be expected from it was heat, which in turn could produce power. And heat and power play almost negligible parts in processes affecting the comfort and happiness of mankind. The cost of fuel in cooking was trivial compared with the cost of the food cooked; and from one-half to one-third of the nation's expenditure was on food. The cost of electric power used in driving a sewing-machine was negligible compared with the cost of a suit of clothes —and one-eighth of the national expenditure was on clothes. The power used in making and laying bricks was trivial compared with the cost of the house—and nearly one-eighth of the average man's budget goes in house rent or purchase. Furthermore, the cost of distributing power is far greater than the cost of power at its source. Nuclear energy, he said, would not

revolutionize society and enable us to live a

freer and happier life.

But he agreed that the discovery had very real dangers and might lead to the disintegration—not of the material world but of civilization as we know it. Nor could the so-called secrets be kept. The principles were already common knowledge among scientists of all nations. But the actual processes involved were extremely complicated, costly and dangerous, and they could be adopted only by organized instruction or by long and very costly experiment. Hence it would appear that, while there is no secret in the proper meaning of the word, only nations which have adequate industrial facilities may be able to avail themselves of the process. And suppose those who have already perfected the process and applied it to the manufacture of atomic bombs were prepared to impart their knowledge and skill to others and to offer them every facility for learning how to manufacture these deadly weapons; would that be a good way of ensuring peace? "Is it the best way to prevent a race," asked Lord Cherwell, "to get all the competitors lined up behind the starting gate?"

Nor, he continued, was it at present a practicable proposition to hand the manufacture and control of this new weapon over to the Security Council of the United Nations. Not until adequate measures could be taken to protect the production plants and storage places of the bombs and to ensure their effective use by the Security Council as deterrents of aggression—not until those problems had been really solved would it be reasonable to talk of handing the whole thing over to the United Nations.

"In learning how to manipulate nuclear energy," Lord Cherwell concluded, "man has taken the greatest step in the control of the forces of nature since his half-human ancestors learned how to make and maintain fire"... but ... "this new weapon might be utterly destructive of all that has been built up in a thousand generations. Perhaps the threat of this new weapon may in the end bring home to the various nations the over-riding need for finding means, at no matter what cost and sacrifice, of reaching agreement without resort to force. We must pray that this will be achieved in time; for if it is not, the end of civilized life on this planet is at hand."

International Economic and Social Co-operation

When the Commission concerned with the General Assembly questions at San Francisco

was convened to hear the report of the Committee on Economic and Social Co-operation, Field-Marshal Smuts, in his introductory speech, said that the Economic and Social Council of the United Nations was the most important innovation in the Charter. The rapporteur stated in his report that the Committee kept in view the importance, for the maintenance of peace, of effective international collaboration in economic, social, cultural and related fields. He went on:

"If during the period of transition from war to peace and thereafter the nations of the world work together for the solution of these problems, that collaboration will greatly reinforce the political and security provision of the document we have come together to draw up. On the other hand, should these problems be dealt with piecemeal—should the world again drift into the chaos of unco-ordinated national action, especially in the economic field—the maintenance of peace by even the most wisely conceived and courageously administered organization would be well-nigh impossible."

The report also pointed out that successful operation of the Economic and Social Council will "contribute to the attainment of peace in this world by substituting the method of joint action for unilateral action and by progressively shifting the emphasis of international co-operation to the achievement of positive ends, in lieu of the negative purpose of preventing the outbreak of war by way of organized security measures."

The work of this Committee is of fundamental importance. Indeed, the Economic and Social Council was established as one of the principal organs of the new United Nations Organization. The creation of conditions of stability and well-being is fundamentally necessary for peaceful and friendly relations among nations.

World War Victory (Thanks to Services)

Moving a Motion of Thanks in the House of Commons on 29th October the Prime Minister (Mr. Atlee) paid this tribute to the Royal Air Force:

"That the thanks of this House be accorded to all ranks of the Royal Air Force for the dauntless heroism with which, in 1940, they faced overwhelming odds and, in doing so, saved our beloved country and all humanity; for the resolute courage with which, undeterred by heavy losses, they harried the enemy's war

industries and communications and crippled his powers of resistance; for the bravery with which they co-operated with the Navies and Armies seeking out and destroying the forces of the enemy wherever they could be found; and for the sustenance of those who carried on the fight for liberty behind the enemy's lines; and to the air transport crews for their resource and endurance in keeping the air routes open; and to the Royal Observer Corps for their ceaseless vigil in defence of their homeland."

Civil Aviation (Government Policy)

A brief summary of the Government's policy for civil aviation was given in the House of Commons on 1st November. It was not proposed at the present time to form an international organization for the ownership and operation of air transport services. That must wait for the day when the fullest international co-operation in air transport had been achieved. In the meantime, therefore, the scheme which the Government now presented was necessarily a national plan. It was so framed that it could be fitted into any scheme of Commonwealth, or international organization which might be subsequently promoted.

The following is a summary of the proposals:

Aerodromes.—It is proposed that all transport aerodromes, that is aerodromes required for regular scheduled services, shall be acquired by the Minister of Civil Aviation. It is not proposed to acquire any transport aerodromes such as those used by clubs or for training or private flying.

Prestwick is to be designated as an international airport. Plans have been made for certain national services to be operated via Prestwick, the number to be determined by traffic demands. The policy ensures that Scotland will be enabled to play its part in civil aviation, with regard both to services and to airports, by the opportunities provided for international services, services between Scotland and the rest of the United Kingdom, and direct services between Scotland and oversea countries.

Organization of Air Services.—It is proposed to have three public corporations to operate all recognized scheduled services within the assigned fields, one of these corporations will be the existing B.O.A.C. to which will be allotted the services between the United King-

dom and other parts of the British Commonwealth, the United States and the Far East. Another corporation will be set up to operate services between the United Kingdom and the continent of Europe, and also an internal British service. Each of these corporations will be wholly financed out of Government funds. My Noble Friend will appoint the boards of the three corporations and will have the power to determine any appointment. Any further corporations or subsidiaries to prevent undesirable overlapping could be set up at a later stage.

Co-operation with other forms of Transport.—The Government attach great importance to co-ordination between the air services and other forms of transport. The railway and shipping companies and the travel agencies will be unable, it is considered, to bring about that co-ordination and in view of the Government this does not justify the assigning to services interested of any financial holding in the proposed corporations.

Payments for Assets.—The Government will make fair payment for any physical assets that are taken over.

Temporary Provisions.—The policy outlined will need legislation, but in the meantime it is proposed that the B.O.A.C. shall initiate external services throughout the whole world as trustees for the new corporations. It is proposed to strengthen the board of the B.O.A.C. The European and South American corporations will in due course "hive off" from B.O.A.C.

As B.O.A.C. cannot initiate an air service without an order by the Minister requiring a long and complicated procedure, the existing internal operators will be asked to continue until the corporations are formed.

Charter Flying.—The three corporations will be empowered to engage in charter flying but this, unlike the scheduled services will not be reserved exclusively to them. Private operators engaged in charter work will be required to conform with the standards of flying and welfare.

Private and Club Flying and Gliding.—It is not proposed to allow any restrictions on private and club flying or gliding, except such as are needed for safety. The lifting of the ban on civil flying contained in the Air Navigation Restrictions in Time of War Orders will be rescinded on 1st January, 1946.

Brabazon Committee.—It is proposed to keep the Brabazon Committee in existence to advise on new types of civil aircraft.

Essay Competitions

1945 COMPETITION

Entrants are reminded that the closing date for this competition is 31st December. Awards will be announced in the March, 1946, number.

1946 COMPETITION

The subjects, conditions and prizes will be announced in the March, 1946, number.

Chief of the Air Staff

Marshal of the Royal Air Force Lord Portal of Hungerford, G.C.B., D.S.O., M.C., will relinquish the post of Chief of the Air Staff and First and Senior Air Member of the Air Council on his retirement from the Service on 1st January, 1946.

The King has been pleased to appoint Marshal of the Royal Air Force Sir Arthur Tedder,

G.C.B., to succeed him.

Marshal of the Royal Air Force Lord Portal of Hungerford has been Chief of the Air Staff and Senior R.A.F. Member of the Air Council since October, 1940. His period of office, which covered all but the first year of the war, saw the great expansion of the power of the Royal Air Force in all theatres and the growth of the air offensive against Germany from a small beginning to the massive instrument which made so great a contribution to the defeat of the enemy. On him more than on any other R.A.F. officer has fallen the burden of shaping and controlling the policy of the R.A.F. during the war. As a member of the Chiefs of Staff Committee, Lord Portal has also played a full part in presenting to the Prime Minister and War Cabinet the advice of the Chiefs of Staff on Allied strategy and on other important matters of military policy. In this capacity, he took part in all the war-time conferences of the Allied military leaders, culminating in the Tripartite meetings at Teheran, the Crimea and Potsdam.

Lord Portal enlisted in the Royal Engineers as a despatch rider in August, 1914, and was later commissioned. He served for three and a half years in France during the 1914-18 war, being seconded to the R.F.C. as observer in 1915 and pilot in 1916. He was awarded the M.C. and D.S.O. and bar while in command of a flight and squadron.

In 1919 he assumed command of No. 59 Wing, Cranwell, and in 1923 after graduating

at the R.A.F. Staff College was posted to the Directorate of Operations and Intelligence, Air Ministry, for Air Staff duties. He completed the senior officers' course at the Royal Naval College in 1926 and later attended a course at the Imperial Defence College.

In 1930 he returned to the Air Ministry for Air Staff (Plans) duties, where he remained until he assumed command at Aden in 1934. Two years later he became an instructor at the Imperial Defence College, and from 1937 until February, 1939, was Director of Organization

at the Air Ministry.

Immediately before the war he was filling the key post of Air Member for Personnel in the great drive for building up the strength of the R.A.F., and in the first spring of the war became Air Officer Commanding-in-Chief, Bomber Command.

Lord Portal was born at Hungerford, Berkshire, in 1893, and was educated at Winchester and Christ Church, Oxford. He was created G.C.B. in June, 1942, and a Baron in August,

1945

Marshal of the Royal Air Force Sir Arthur William Tedder became Deputy Supreme Allied Commander on the formation of the Allied Expeditionary Force in Great Britain at the end of 1943, a position he held until its dissolution following the defeat of Germany. In this position he was responsible to General Eisenhower for the general control and co-ordination of Anglo-American operations against Germany.

Before his appointment to S.H.A.E.F., Sir Arthur Tedder had been Allied Air C.-in-C. Mediteranean Allied Air Forces from its establishment at the beginning of 1943, having succeeded to this position from the purely British post of A.O.C.-in-C. Middle East. The period of his tenure of the Chief Air Commands in Africa saw the great build-up of the British and Allied Air Forces in the Mediterranean; the power of the air forces under his command was demonstrated when the 8th Army broke through at El Alamein in November, 1942, and again during the final defeat of the German and Italian armies in Tunisia. During this period his name gradually became known to the general public as one of the great leaders of the war, a reputation which was fully confirmed during "Overlord" and the Allied advance into Germany.

Sir Arthur Tedder was commissioned in 1913 in the Dorset Regiment and the following year he was on active service in France. In 1916 he was seconded to the Royal Flying Corps. Since then his whole life has been bound up with aviation.

He fought as a pilot in France and was several times mentioned in despatches, and later saw service in Turkey during the Chanak crisis in 1922. In 1928 he attended a course at the Imperial Defence College. After service as Director of Training at the Air Ministry he went to Singapore in 1936 as Air Officer Commanding, Far East Command. Returning to the Air Ministry two years later as Director-General of Research and Development he became in August, 1940, Deputy Air Member for Development and Production in the Ministry of Aircraft Production. Three months later he went to Egypt as Deputy A.O.C.-in-C. Middle East.

Sir Arthur was born at Glenguin, Stirlingshire, in 1890. He was educated at Whitgift School and Magdalene College, Cambridge, where he was awarded the University Prize for a brilliant essay on the British Navy of the Restoration.

He was created G.C.B. in 1942.

Sir Arthur is the eighth holder of the rank of Marshal of the Royal Air Force. In addition to Lord Portal of Hungerford and Sir Arthur Tedder, they are: The King, Lord Trenchard, Sir John Salmond, the Duke of Windsor, Sir Edward Ellington, and Sir Cyril Newall.

A Commonwealth Air Force

This has been the subject of articles and editorial comment in recent numbers of this Journal. In a recent number of The Commonwealth and Empire Review there appeared an article on this subject by Lieut.-Colonel W. P. Stanford, D.F.C., of the South African Air Force, who reinforced the arguments expressed in the R.A.F. QUARTERLY. He suggested that "we have, just as we did in this war, a Commonwealth Air Force. Knowing by experience how reluctantly most people give up their previous identity to merge into a greater one, I feel it would be a bar to an otherwise practicable suggestion to suggest that this Air Force would wear one uniform and all do the same things. We have shown in this war that fundamentally there is no difference in line of action of R.A.A.F., R.C.A.F., S.A.A.F., R.A.F. or R.N.Z.A.F. Let them go on each wearing their own special uniform. It probably helps to make morale good, and no man is worth his salt who cannot defend the land in which he was born, but as before keep the tactics of the aircraft and the main instructions the same. Let those all be the best we can produce, and by the best brains of the whole Commonwealth. Co-ordination on these lines ought to present no difficulties since it is being done this very moment and can be easily improved.

"The idea then is for each Dominion and Colony to have as well as its fair contribution of Air Force, bases ready to accommodate the vast Strike Force of the Empire and the necessary stores available to cope with high pressure operations for a period sufficient to allow the main weight of supplies to be brought in from the other parts of the Empire.

"The Squadrons, Wings and Groups of the various Dominions will rotate on training programmes getting used to the various conditions pertaining in different parts of the Empire and learning to know one another personally. They can keep up with the latest tactics and establish a real basis to work from. This is the most vital part of the plan that the various Dominions send their teams to one another, thus fusing into one solid whole what might otherwise have been a mere arrangement on paper as so many of our arrangements are. Not only that, but from the interest point of view for the Air Force this would be invaluable in maintaining a high standard of morale and efficiency."

Polish Squadrons

Air Chief Marshal Sir Sholto Douglas recently opened a R.A.F. exhibition to Warsaw in the Polish National Museum, one of the few buildings intact among the devastation caused by the Germans.

The exhibition shows the people of Poland the work of the R.A.F. and pays tribute to the Polish squadrons who fought alongside the R.A.F. throughout the war.

After a short speech of introduction by the British Ambassador to Poland (Mr. Victor F. W. Cavendish-Bentinck, C.M.G.) Sir Sholto spoke to 200 Warsaw personalities, including members of the Cabinet and of Allied military and civil delegations—English, American, Russian, Swedish, Italian, Czech, etc. He described the wonderful work of Polish fliers in all branches of operations, and stressed their fine spirit and indomitable courage, telling how. after losing 95 per cent. of their strength in the Battle of Warsaw, they went on to destroy 273 enemy aircraft in the Battle of Britain, 15 per cent. of the total shot down.

He concluded his speech by saying: "I pray that some means can be found, some honourable arrangement made, whereby the gallant squadrons can return to Poland with all the honour which is their due."

Bomber Chief's Farewell to French Squadrons

The Guyenne Squadron, the first of two famous French bomber squadrons which flew during the North African Campaign and later with R.A.F. Bomber Command, left Elvington Airfield, Yorkshire, recently to return to France.

Air Marshal Sir Norman Bottomley, K.C.B., C.B.E., D.S.O., A.F.C., Air Officer Commanding-in-Chief, Bomber Squadron, attended a farewell parade of both squadrons—the Tunisia and Guyenne Squadrons.

Speaking in French, the Air Marshal said that they were returning home covered in

glory.

"It marks the attainment of a long-cherished goal, and the beginning for you of a new era. I wish to express to the Tunisia and Guyenne Squadrons our deep appreciation of the heroic and unselfish spirit which has animated your units.

"You have fought with us from England since the early summer of 1944, carrying the war deep into the enemy's camp. I must record the debt we and you owe to Colonel Bailly, your first Commander, who, with his gallant aircrews, has earned our admiration and respect.

"I wish to add a word of appreciation to those of you who have worked on the ground, keeping the squadrons in the air. Your work was indispensable, and you have had the great satisfaction of keeping an exceptionally high

standard of maintenance."

Air Marshal Sir Norman Bottomley added that they remembered with respect those who had given their lives for the Allied cause and for the cause of all those who had suffered from enemy oppression and aggression. He hoped that the close association which had been forged between the two Air Forces would continue.

The second French squadron—the Tunisia Squadron, left for France at the end of October.

Aircrew and ground personnel of the two squadrons came from North Africa to Britain in September, 1943.

They were given refresher training and reformed as Halifax squadrons in June, 1944. From then until VE Day they operated over Europe with R.A.F. Bomber Command.

The Czechoslovak Air Force has left Great Britain

Shortly after the news arrived that World War II was over, crowds gathered on the Prague Airfield at Ruzin to cheer Czech airmen who had returned after six years of war.

The Spitfires of the three Czechoslovak fighter squadrons (Nos. 310, 312 and 313) on leaving England were expected in Prague the same day. But bad weather kept them grounded for a week near Hanover.

On the day after the fighters arrived at Prague, the Liberators of No. 311 Squadron touched down. The official reception took place on the morning of VJ Day.

The Czech airmen were for the time being posted to Prague as R.A.F. personnel. They took with them the traditions and habits they have learned in Great Britain. Thus most of the conversation with flying control was done with the help of English words and terms.

The Czechoslovak Minister of National Defence, General Svoboda, addressed the Czechoslovak airmen at a parade in front of the main building of Ruzin Airfield, with their aircraft lined up behind them.

With General Svodoba on the platform were the British Military and Air Attaches, the Chief of the Soviet Military Mission, the Chief of Staff, General Bocek, Air Marshal Janousek, Inspector General of the Czechoslovak Air Force in Great Britain, and other official guests. Addressing the Czechoslovak airmen, General Svodoba pointed out that the Air Force was the first among the Czechoslovak Forces to take an active part in the fight against the enemy, and has never ceased to operate since 1939. He gave a brief outline of the history of the Air Force during the war, and declared finally: "At this opportunity, I want to thank, in the name of all the Czechoslovak people, the Government of Great Britain for all the help and support we have received. Great Britain has given us the most modern air weapons and all the necessary means to enable us to carry on a successful and victorious struggle. I thank the British people for all the help, friendship and affection they gave you during your stay in Great Britain. Thus you have been able to strengthen the links between ourselves and the great British nation. In the name of the Government of Czechoslovakia and of our Armed Force, I thank the British Government and its people for all their help, confidence and friendship."

Escape

By the late FLIGHT LIEUTENANT E. G. BRETTELL, D.F.C., R.A.F.V.R.

(With apologies to Rudyard Kipling)

[EDITORIAL NOTE.—Flight Lieutenant Brettell was one of the fifty R.A.F. and Dominion and Allied Air Force officers who were murdered in March/April, 1944, after their escape from Stalag Luft III.

Flight Lieutenant Brettell wrote these lines on the wall of his cell while undergoing solitary confinement after an attempt to escape some nine months before the effort that cost him and his comrades their lives.

These lines are a fitting epitaph to these airmen and the spirit which animated our prisoners of war.]

If you can quit the compound undetected
And clear your tracks, nor leave the smallest trace,
And follow out the programme you've selected,
Nor lose your grasp of distance, time and place.

If you can walk at night by compass bearing, Or ride the rail barefaced by light of day, And temper your elusiveness with daring, Trusting that sometime bluff will find a way.

If you can swallow bitterest frustration,
And gaze unmoved at failure's ugly shape,
Remembering as further inspiration
It was, and is, your duty to escape.

If you can keep the great Gestapo guessing
With explanations only partly true,
And leave them in their heart of hearts confessing
They didn't get the whole truth out of you.

If you can use your cooler-fortnight clearly
In planning methods better than before,
And treat your first miscalculations merely
As hints let fall by Fate to teach you more.

If you scheme on with patience and precision (It wasn't in a day they builded Rome),
And make escape your single, sole ambition,
The next time you attempt it—you'll get home.

^{† &}quot;Cooler" was the name given to the camp prison where prisoners-of-war were placed in solitary confinement for disciplinary offences, including attempted escape.



Air Power in Imperial Defence

BY WING COMMANDER D. F. B. SHEEN, D.F.C.

THE present day has no value to me except as the eve of to-morrow; it is with that my spirit battles" (Metternich). Surely there can have been no other time in history when those words of wisdom had a more urgent message to give than to the peoples of the British Empire to-day. We have seen the Empire, with her pitifully weak forces scattered throughout the world, brought almost to her knees. We have seen a disaster of immeasurable proportions staved off by a margin so slim that even now it is hard to estimate, and we have seen the Empire rise up again to the absolute victory about to be won. The key to our failures and to our subsequent triumphs rests with air power, and it is to air power that we must pin our hopes for the future defence of the Empire.

The Empire has abundant resources of nearly all the raw materials with which to wage war, but these resources are widely dispersed. The strength of the Empire in the past has rested on its ability to maintain the vital sea lines of communication against the efforts of her enemies. That has been the prime task of the Navy, but the power of the Navy to safeguard those supply lines has been seriously challenged. The menace of the submarine, which revolutionized sea warfare in the First World War, continues to-day and will continue in the future. The battles of the Atlantic and Arctic Oceans show that only by the united efforts of the Navy and Air Force can the undersea threat be countered.

To the threat of the submarine must be added the ever-increasing threat from the air itself. Developments in aviation are still in their infancy and yet already we have seen that the Navy cannot operate unprotected in the face of heavy air opposition. The battles of the Mediterranean in 1941 and 1942 will go down in history, but the heavy losses in fighting and merchant ships reflect the cost of attempting to maintain our lines of communication without air cover.

But it is to the Far East that we must turn to see the paralysing effect of air power in modern sea war. The balance of sea power in the Pacific was virtually changed overnight by the destruction of the American Fleet in Pearl Harbour. To that must be added the sinking, also by air attack, of the *Prince of Wales* and *Repulse*, losses which almost sealed the fate of the whole of the Pacific. History shows that the subsequent victories of the Japanese in that theatre of war, in space and time, have never before been equalled. Nevertheless, those advances were halted by air power. In May, 1942, a small land-based air force annihilated a Japanese force in the Coral Sea sailing to

invade Australia. In June, 1942, the Battle of Midway Island was fought by sea and air at ranges of 700 miles with the resultant defeat of the Japanese fleet concerned. Control of the sea in the future can only be effected by control of the air.

The Navy as the national first line of defence has, in modern times, always been reasonably strong, in comparison to other powers, and has had the benefit of good bases, secure by pre-war standards and established at strategic points throughout the world. The Army and Air Force, on the other hand, have suffered to a very marked degree from the financial limitations imposed by the Treasury. The Air Force was well equipped but lacked quantity; the Army entered the war both ill-equipped and undermanned. These weaknesses reflected themselves in the painful defeats to which we were subjected in the early days of the war. Singapore, the most vital point in the Far Eastern strategy, fell before adequate reinforcements could arrive, but before that, and nearer to England, two early campaigns set the seal on modern war tactics and pointed the way to the future.

Firstly, the German entry into Norway in early 1940 seemed an expedition destined to fail; our Prime Minister said at the time that Hitler had "missed the bus." On the contrary, we discovered that his air transport had been developed to a point never before envisaged by us. Even more important, we learned, at bitter cost, that an army with air protection could make a sea crossing and consolidate on land. Without air cover it was doomed.

Secondly, Crete in 1941 became the testing ground for airborne operations. Here, again fighting against overwhelming air superiority, our Army was defeated by enemy forces landed from gliders and by parachute. "The story of Crete is the story of enemy air domination. Because of that he was able, despite appalling losses, to put into effect the parachute technique of vertical envelopment, and his invasion was bound to succeed" ("The Australian Army at War," page 19).

The importance of air power in the land battle has been stressed many times by Field-Marshal Sir Bernard Montgomery, and in the 21st Army Group publication "Some Notes on the Use of Air Power in Support of Land Operations and Direct Air Support" the following significant paragraph appears:

"The moral effect of air action is very great and is out of proportion to the material damage inflicted. In the reverse direction, the sight and sound of our own Air Forces operating against the enemy have an equally satisfactory effect on our own troops. A combination of the two has a profound influence on the most important single factor in war—morale " (para. 11, subpara. (f)).

The power of the Air Force to inflict material damage on the enemy increases with each development of aerial weapons. There can be no doubt that in the land battles of the future the Air Force will play an even more immense part than it has in this war.

The custom of a formal declaration of war has become obsolete. Nations are now in the habit of exploiting to the full the element of surprise and declaring war, if at all, only after the initial attack has been made. We are therefore always at a tremendous disadvantage in defence. The aggressor can mass his forces against a weak point at a given time of his own choosing. Such an attack can be either a seaborne, airborne or land attack and with the introduction of rocket warfare yet a fourth method will undoubtedly play its part in the future. To counter the threat of surprise the problem of rapid and effective concentration of our forces must be solved before any measure of security can be given to the Empire. We have seen that air power is a prerequisite of sea and land power, and in this paper I shall attempt to show the defence requirements of the Empire in the geographical sequence of the United Kingdom and Canada; the Middle East and African continent: India and the Far East; and to show how air power can assist in meeting those requirements bearing in mind the strategic, economic, climatic and training factors involved. The United Kingdom is the geographical key to Europe, both by sea and air, and is the established centre of the Empire. It is therefore fitting that it should be dealt with first.

The strategic importance of the United Kingdom as the Empire forward base for all operations against the Continent cannot be overemphasized. The United Kingdom is an island fortress and need therefore be defended only against air and seaborne attacks. The first calls for a well-trained and well-equipped fighter force backed by adequate intelligence in the form of Radar or similar scientific aid. It is now a principle that an invasion from the sea cannot be carried out without first obtaining air superiority, and here again the demand is for fighter defence. Such a defence was available in 1940, with the resultant defeat of the German Air Force, and the failure of the enemy to attempt an invasion of England despite our manifold weaknesses on land. The first essential in the defence of the United Kingdom must therefore be a strong fighter force backed by an efficient Radar network.

The bomber is the offensive weapon of the Air Force; it is the only weapon we possess to-day which can carry the war into the very heart of an enemy country, to undermine its ability to wage war and continue resistance. The bomber cannot completely defeat an enemy; it has not the physical power of occupation, but it can reduce an enemy nation to a point where the physical problems are reduced to a minimum. In the present war the bomber force based in England has maintained a strategic role with its efforts directed against the industrial and economic resources of the enemy. Just how far the aim of Bomber Command has been achieved is difficult to assess, but there is no doubt that the invasion of Normandy would not have been possible had it not been for the paralysing effect of the bombers on transportation and the production of the necessities of war inside Germany and the occupied countries.

The bomber is also a purely defensive weapon. It was used as such against the enemy invasion barges concentrated along the coast of the occupied countries in 1940 for the final assault on Britain. It was used as such against the enemy submarine bases and has played its part in the destruction of the heavy elements of the German Fleet. These elements, although seldom at sea, maintained a powerful threat in being and a complete British battle fleet has been immobilized throughout most of the war against their going to sea to harass our sea lines of communication.

A large bomber force designed and equipped for the strategic bombing of all possible aggressors in Europe must therefore be considered the spearhead of the British fighting forces. The bomber may, in time, be superseded by scientifically controlled weapons, but until that time comes about the power of the bomber remains supreme.

The United Kingdom is dependent almost entirely on imports for the essentials to wage war. Our life-lines across the Atlantic and to the south in the present conflict have been our most vital and vulnerable lines of communication. There is no doubt that the menace of the submarine will exist in the next war as it has in this, and it is clear that the Navy alone, with the limited radii of action of her ships, cannot provide the complete answer. It must be supplemented by aircraft capable of continued long-range reconnaissance and based, as in this war, in the United Kingdom and at strategic points elsewhere.

This war has demonstrated the power of the air force in land warfare. The part played by ground-attack aircraft and tactical bombers and

fighters has shown that no army of the future can be considered complete without the assistance of a mobile air force, capable of providing first of all protection from air attack and secondly possessing the power of hitting the enemy in his strongest and weakest points. In normal times the Army is based in the United Kingdom, from which it draws its man-power. The Tactical Air Force for employment with the Army and which must be considered an essential part of our defence forces of the future must therefore be sited, side by side with the Army, in the United Kingdom.

It will be seen that the Air Force required for the defence of the United Kingdom alone is considerable, but it must be pointed out that in future warfare the United Kingdom may prove extremely vulnerable to rocket attacks. It is therefore essential that the main productive and reserve base for our Air Force (and indeed for all war industries) be outside the probable range of rockets. Canada, by virtue of its geographical position and industrial potential, must be the obvious choice. Canada herself will require a strong 'Air Force. She has long coastlines to defend and in the future may well be within range of bombing attack. Canada will require aircraft to enable her to take her share in the protection of the sea lines across the Atlantic and into the Pacific, and she will require strong anti-shipping forces to counter a possible seaborne invasion. Canada must be the Empire's air arsenal of the future, hitting the enemy, if not from its own territory, through the bases sited throughout the Empire.

Turning now to the Mediterranean, it is on record in Rowan-Robinson's "Imperial Defence" that a former Prime Minister of Britain said that "absolute certainty that the Suez Canal would remain open for the free passage of British ships is the foundation on which the entire defensive strategy of the British Empire rests." The Mediterranean has also been described as a "great highway of the Empire." Nevertheless, this war has proved that the closing to us of the Mediterranean is not in itself decisive.

British possessions in the Middle East are not considerable, but although rich in practically all the basic raw materials for war the Empire has little or no petroleum. She is dependent to a very large degree on the oilfields sited at various points adjacent to the Indian Ocean. The main line of communication from India runs through the Mediterranean and it is therefore very much to our advantage to keep that passage open. Even so, the problems of providing adequate protection against enemy sea and air forces suggest that in future war strategy we depend entirely on the route round the African continent. The main sur-

face route from Australia will in any event pass through the Indian Ocean and round the Cape of Good Hope and air cover over our sea lines will therefore not be duplicated.

Our aim in the Middle East must be to ensure that no enemy power can control the Suez Canal and oilfield zone. In that area we have neither the territory nor the resources on which to base large forces in peace. We must therefore base a powerful Air Force in India, the possessor of almost unlimited resources. The key to India itself lies through the Middle and Far East and her defence must be bound up inextricably with her ability to reinforce either zone speedily and with force. This can only be achieved by an air fleet moving over well-prepared strategic bases.

Moving on to the Far East, we find that an Air Force designed and built on the lines suitable for operation in the European theatre of war, on existing standards, is not entirely suitable for employment throughout the whole of the Empire. So far, continental aircraft requirements have been limited to ranges of about 1,800 miles. These requirements may well be increased in the future, but it is likely that in that event our bases will be moved nearer the scene of operation rather than have hitting power sacrificed for range.

In the Far East there are enormous expanses of sea to be crossed and ranges of around 4,000 miles are a necessity. There is also the question of the influence of climate on the operation of aircraft, a question which will be dealt with later. Seversky suggests that "Aircraft types must be specialized to fit not only the general strategy but the tactical problems of a specific campaign." This is obviously an ideal capable of attainment only by long-term planning of aggressor nations, but in defence the best that can be achieved is the maximum specialization of types to suit the geographical and climatic conditions of the theatre in which the aircraft are expected to operate. The requirements in the Far East are, first and foremost, the aircraft range to reach the centre of the enemy's industrial and economic resources, combined with the striking power to achieve decisive results.

For man-power and financial reasons, effectual garrisoning against a major attack cannot be achieved at all points, and this is certainly true with our possessions in the Far East with the enormous expanses of territory and water involved. A seaborne attack must therefore be defeated at sea either by naval or air forces, or by a combination of the two. In this respect the Air Force has the advantage of speed. Experience has proved the ability of bombers to sink even the largest battleship, and with advances in bombing aids, heavier bombs and rocket projectiles, there can be little doubt that an Air Force in sufficient

strength could destroy an invading force or at least reduce it to manageable proportions for the land and sea forces. The Air Forces would also be able to play havoc with enemy lines of communication stretched as they would be to an enormous extent.

Invading sea forces, however, would certainly be supported by escort carriers, and to avoid prohibitive losses our air striking force must have the benefit of fighter escort. So far, land-based aircraft have always been superior to carrierbased aircraft, but it is reasonable to assume that future developments of rocket-assisted take-offs and arrester gear will reduce the difference in performance. In fact, an escort fighter capable of flying at the extreme range required may well be inferior to a short-ranged carrier-borne aircraft. The solution to this problem may depend on the development of jet-propelled fighters which will be carried by a proportion of the bombers and slipped when required. It would be necessary for the bombers to retrieve the fighters for the purposes of refuelling and carriage on the return journey.

In order that a seaborne or any other type of invasion can be defeated, adequate intelligence is vital. Radar can give a close-range warning of air and sea attack, but for topographical reasons cannot give a long warning of surface craft. Intelligence must therefore be gained from naval or air reconnaissance and obviously of these the air is the more efficient and economical. In the Far East, as in the other zones, a requirement will always exist for suitably based, very long-ranged aircraft to maintain up-to-date intelligence of all possible areas of possible invasion and, after the beginning of hostilities, of all enemy bases from which military action can be directed.

In a land war in the Far East the requirements of the Army for direct-support aircraft will doubtless follow on similar lines to those of a European theatre of war. Land forces employed in jungle warfare, however, are normally much smaller than European forces, and it is probable that the Tactical Air Force employed in the Far East would be scaled down accordingly and more dispersed in application. Nevertheless, the whole basis of defence in the Far East must be to avoid, as far as possible, land operations and to defeat the enemy at sea, using our sea and air forces. The role of the Army must be to invade and occupy the enemy territory after its power to fight has been effectively destroyed by our air forces.

The final but by no means least essential for our defence forces of the Far East is an Air Transport Service. The main base for our forces will obviously be Australia, which must, as must Canada, produce the means to wage war in its zone of operation. But the coastlines to be watched and the distances involved are enormous and the effective concentration of force to defend a threatened area can only be provided by air transport. The effect of air transport on operations in this theatre has already been proved; in the New Guinea campaign of 1943 troops were flown into the battle area and supplies maintained by air in zones otherwise inaccessible. Air transport played a tremendous part in the success of that operation which paved the way for subsequent operations in Burma and later on in Europe. The establishment of a large air transport service in the Far East is a vital factor in its future defence.

From these factors two of the requirements for our Air Forces in the future defence of the Empire emerge. Firstly, we require a series of Strategic Air Forces based in each of the potential theatres of war. The backbone of each force must be the heavy bomber, designed to strike at, and maintain a consistent offensive against the vitals of the enemy. The security of a nation is very largely dependent on its ability to hit back and hit hard, and there can be little doubt that the presence of a devastating weapon in a strategic position will be the greatest deterrent to any possible aggressor nation.

In addition, our Strategic Air Forces must contain adequate forces to safeguard our sea lines of communication on which the Empire depends for the continued prosecution of a war. Air cover must be provided, either by carrier-borne or land-based aircraft in all areas where our shipping may be menaced by attacks by air or naval forces. Our Strategic Air Forces must contain sufficient numbers of both purely defensive and escort fighters; there is a distinct requirement for both types which must be satisfied in our future organization. The further requirements for aircraft for employment in direct support of the Army and aircraft for reconnaissance and anti-submarine work need no further stressing.

It is, however, extremely doubtful whether the dictates of finance will ever permit the provision of the air forces desired and accordingly our Air Force of the future must be far more mobile than hitherto. Our existing European bomber, for example, is tactically mobile but strategically immobile. In our future organization all forces must be fully mobile and this can only be achieved by the provision of an air transport service capable of moving a large force, as and when required, speedily and without serious interference with current operations. The case for the transport aircraft, which alone in peace can pay a dividend as an efficient trooper for overseas garrisons, is one against which there can be little argument.

Nevertheless, in dealing with the interchangeability of air forces, it is as well to consider the



major limitations. The climatic conditions in Europe bear no relation to those in the Far East and operations in the latter theatre have shown that each item of equipment must be specially designed and chemically treated to withstand the effects of the humid atmosphere. The influence of the climate is most noticeable in certain types of radio equipment and not all aircraft can be operated in hot climates without considerable modification. The other extreme, Arctic flying, may well figure prominently in future warfare, and it is obvious that under such conditions rapid reinforcement from one theatre to another may well be impossible. The specific tasks and the especial climatic and geographical problems will insist that the future Far Eastern Strategic Air Force is capable of undertaking any operation without outside assistance.

The second basic essential for our future air forces is the provision of bases from which to operate our aircraft. The mobility and effectiveness of air forces, even more so than with the Navy, are dependent to a very large degree on suitable bases at strategic positions. This question is a vital one for the future security of the Empire and is one on which the whole basis of our air strategy may depend. The Navy obtained her bases by conquest, or otherwise acquired them without excessive difficulty. We must ensure that we establish throughout the world bases from which we can provide our naval and land forces with security from air attack. We require also bases capable of operating the largest types of aircraft and equipped to do so, sited in strategic positions to effect the maximum concentration of force against our enemies.

In addition to these essentially operational bases we require a chain of bases throughout the world to allow the rapid and safe passage of our air transport aircraft carrying reinforcements of men and material. Many are already in existence, but many more are required, particularly in the Middle and Far East. The development of these air transport bases must figure prominently in our post-war planning, both for defence and for rapid communication within the Empire.

The third and fourth basic essentials have not been mentioned before and, in fact, they are occasionally overlooked in the discussion of air power. Nevertheless, they are of major importance. They are the maintenance of supreme quality in technical equipment and the highest possible standard of personnel to use that equipment. The history of this war has shown that, within limits, quality is always superior to quantity. The Battle of Britain was perhaps the most outstanding example, and there is no doubt that this necessity for quality applies to all aspects of air warfare—air crew, aircraft and equipment, and ground

crew. Our technical lead, particularly in Radar, has played a vital part in the conduct of this war, and by continued research in the future we must ensure that these technical advantages are maintained. We must also ensure that the highest standard of air crew is maintained by the provision of an efficient training organization manned by highly experienced and specially selected personnel.

Training and research, however, must not be limited as it was in the pre-war era to European requirements. State warfare on which our past conceptions have been based has now given place to global warfare. Training and research must therefore be extended to cover all climatic and stratospherical conditions to be encountered in future air warfare.

These requirements are in themselves enormous. But they must be met; never again must the Empire be reduced to the invidious weakness of the immediate pre-war period. Our grand strategy of the future must be planned and executed by a vigorous Imperial Defence Committee with energetic representatives of all sections of the Empire. In that strategy for defence, air power must play a predominant part and be implemented through the four major air forces—or air fleets as they may be termed—based in what are in effect the hinges of the world.

No doubt the very maintenance and control of these forces will present serious problems. The major one may quite possibly be the unfortunate division of our air forces into the various United Kingdom and Dominion Air Forces. Politically the formation of an Imperial Air Force is impracticable, but whatever the solution our Strategic Air Forces must be so composed that each part of the Empire will accept its share of the responsibility both in action and financially.

Above all, our various air forces must work in harmony as an interchangeable or composite team. Air power alone cannot win battles, but it will be the keystone of future warfare around which the planning and strategy of the other Services will revolve. We must ensure that the Air Arm is strong enough and capable of undertaking the vast responsibility that it will have in the future defence of the British Empire.

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Air Power and Air Transport

By Wing Commander M. Beytagh, D.F.C.

[EDITOR'S NOTE.—This paper was written before the advent of the atomic bomb. It is yet too early to assess the effect that nuclear fission will have on future bombing policy. The argument in para. 17 may therefore be out of date. However, it is still possible that the size of bomber forces may be considerably reduced owing to the increased destructive potentiality of each bomber. The conclusion arising from para. 17 may therefore still hold good.]

Introduction

- 1. National policy can be carried out either by peaceful or warlike means; but whether in peace or war, national policy can only be successful if the nation's commitments and the nation's power are brought into balance—with a surpus of power if possible. Air power, therefore, I would define thus: it is the contribution the air can make in peace and war to the balancing of the nation's power with the nation's commitments.
- 2. Since we are, in ourselves, a small nation and our commitments are world-wide, we have always been exercised to maintain the powercommitment balance. We have achieved it in the past by a system of alliances, both holy and unholy, which have banded the weaker powers together against the contemporary dominant nation. No doubt in the future we shall continue to follow this wise and effective course; but we have learned in this war that we must also be strong in our right. For us this connotes using every possible means of achieving the belligerent power of a great continental nation with the relatively small population at our disposal. National economy of force therefore is a prerequisite of British belligerent power in a far greater measure than it is of any other present-day nation.
- 3. Air forces with their flexibility, striking power and comparative economy of man-power are therefore a weapon peculiarly suited to our national requirements. Air transport with its ability to give mobility to our fighting formations can increase the striking power of those formations, and their concentration, and so contribute to economical belligerent power. I propose, therefore, in this paper to examine the contributions which air transport can make to air power (as defined above) and to our over-riding national requirement for economy of force.

MILITARY FUNCTIONS OF AIR TRANSPORT

- 4. First let us examine the main military uses of air transport. There are five in number:
 - (a) It increases the striking power of a given force by increasing its speed of concentration at a threatened point, thus making for true economy of force.

- (b) By participating in airborne assault it swells the size of the force which can be launched, and minimizes the effectiveness of natural and man-made obstacles.
- (c) It moves and maintains personnel and equipment regardless of surface communications.
- (d) By saving time in movement, it reduces vulnerability, ties up fewer highly trained and specialized personnel and equipment in transit; enables new weapons and other equipment to be introduced more quickly in theatres remote from centres of production, and enables closer and more frequent consultation between commanders and staffs.
- (e) By carriage of casualties, mail and welfare items it helps to sustain morale and contributes to an overall economy in personnel engaged in these matters.
- 5. Before going on to discuss some of the points arising from the military functions of air transport, it would be as well to examine its limitations and disadvantages in the military role. There are two real disadvantages and one apparent disadvantage, compared with surface transport.
 - (a) There are items of heavy equipment which it cannot carry.
 - (b) It does not eliminate the need for advance preparation of bases.

These limitations are real.

(c) Air movement is more costly than surface movement in direct man-power employed per ton lifted; but when it is properly used in conjunction with military forces, this is more than compensated by the real economy of force, surprise and mobility which it gives.

This disadvantage, therefore, can be considered only apparent in the wholly military use of air transport.

STRATEGIC MOVEMENT

6. As far as air transport operations between theatres are concerned, the first aim is to give air flexibility to specially organized fighting formations which are capable of operating on arrival





A R.A.F. DAKOTA DROPPING SUPPLIES TO TROOPS OF THE 14TH ARMY

A closing incident in the Burma campaign

by air, at least until the arrival of the first sea or

land convoys from the main base.

7. The fighting weapons of the Royal Navy (e.g., warships) cannot be given strategic flexibility by air. The aircraft of the Fleet Air Arm, however, can fly between theatres.

8. Similarly, the principal fighting weapons of the Army (e.g., tanks, artillery) are not flexible by air between theatres in sufficient numbers to

ensure success in major operations.

9. The principal fighting weapons of the R.A.F. (e.g., aircraft) can themselves fly to the point at which our security is threatened. The basic task of air transport (as far as strategic movement is concerned) is therefore to give strategic flexibility to the fighting formations of the Royal Air Force.

10. The need for redeployment of large forces for Phase II of the present war has caused the emphasis of strategic movement to shift for the moment from the movement of air forces to the movement of personnel. This is due to two

causes:

(a) The R.A.F. is not yet designed to be strategically flexible by air.

(b) The peculiar circumstance of a war on two fronts thousands of miles apart, coupled with a shortage of troopships.

Trooping, therefore, can be regarded as a special operation allotted priority by the Chiefs of Staff under special circumstances. It does not in any way break down the conception that the basic strategic role of air transport is the movement of air forces. However, such special circumstances may often arise and it must be remembered that the supply of air transport, like the supply of sea transport, never suffices to meet the demand. It must always therefore be allocated in the light of the circumstances and priorities existing at the time.

AIR FLEXIBLE AIR FORCE

11. It is beyond the scope of this paper to propose a design for a strategically air flexible air force. Clearly, an extensive administrative study, coupled with practical trials, will have to be undertaken before the form and composition of such a force can be crystallized; but we can here examine profitably some of the major problems involved.

12. Let me emphasize at the outset that it is not my intention to visualize the physical form of the air weapons of the future. Indeed, with the enormous technical developments achieved and impending, he would be a bold man who would attempt to do so. Where, therefore, the terms "strategic air force" and "tactical air force" are used, it is with the functional and organizational meaning which they have at present; this without prejudice to the type of weapons such forces will use in the air battle of the future.

Size of the Transport Fleet

13. At first sight a transport fleet capable of giving strategic flexibility to the R.A.F. as we now know it appears to be prohibitive in size, but, on examination, the size of the commitment shrinks appreciably. Firstly, it is only the single-seater fighter which cannot provide any appreciable self-lift. The larger types of aircraft can, even though they are fighting weapons, lift amounts of their own squadron personnel and equipment in proportion to their size. Secondly, the ability of the transport aircraft to shuttle rapidly between the main base and the forward base reduces the overall number required. Thirdly, by making the bulk of our air transport fleet of the "transporter freighter" type (i.e., on the lines of the Me.323), we can, by sacrificing high top speed, increase the weight and bulk of each aircraft load. This again reduces the overall number of transports required. The sacrifice of speed to pay-load will not appreciably affect the speed of the strategic concentration of the force, and can therefore be accepted.

14. Even though the size of the transport fleet is reduced by the factors mentioned above, it is still considerable. It may therefore be argued that this war has shown that our national industrial resources do not permit the building of large numbers of transport aircraft at the same time as we are building and maintaining a huge air striking force of the type which has done so much to win this war. Against this argument I would sound a note of warning. In sounding it I shall have to make assumptions and look into the future—both dangerous pastimes; but whether my arguments are right or wrong, they are based on facts which it would be unwise to ignore.

Balance of Air Forces

15. The conception of the balanced air force is basic. For this war the strategic bomber force tactical air force balance has proved correct. But after all wars there is a tendency to argue conclusions by trying to apply to war as a whole the methods which attained the latest success. The Maginot Line, born of the success of the defensive in the 1914-18 war, is perhaps the supreme monument to such erroneous appreciations. It is important, therefore, that we should not accept without question that the type of air force which has achieved success in this war will necessarily achieve a similar success in a future war. The circumstances of such a war (geographical among others) may lead us to adopt an air transport tactical air force balance rather than the present balance.

16. The causes which may lead to such a change in balance are as follows. So far as can be foreseen, any nation wishing to wage a war of aggression will have to fight a land battle nourished by land and/or sea lines of communication. There is thus an enduring need for a tactical type air force to attack the enemy front and lines of communication, and to protect our own.

- 17. However, any competent military staff planning another war will have at its disposal in Germany a very comprehensive and terrible example of what the strategic air weapon, even as we know it now, can do to a nation's war industry. Clearly, one of such a staff's main preoccupations will be to neutralize this weapon. While no doubt a comprehensive active anti-air weapon defence will be organized, experience has shown that such a defence can be broken down. The only sure method will be to deny to the strategic air weapon its natural industrial targets. Much has already been done to this end in this war, by dispersal; but with the growing ability of the air weapon to find and destroy small targets and wipe out whole towns, dispersal is no longer a guarantee against destruction from the air. The only complete answer is to put the nation's war industry underground. We have seen the beginning of this technique in the reports from Germany and the liberated countries of the discovery of vast subterranean factories. It is a technique which may reduce the role of the strategic air weapon to the destruction of small specialized targets and so reduce the overall number of strategic bombers required to a very small proportion of our present-day force. I doubt if even the everincreasing efficiency of airborne missiles will stop this trend if the underground factory technique is applied with sufficient determination and foresight. Moreover, this technique enormously complicates the problem of finding the target.
- 18. It can still be argued that even if the enemy's war industry is inaccessible, his rail communications and civil population still provide targets for the strategic air weapon. However, in my opinion, the strategic as against the tactical bombing of rail communications has yet to prove itself where facilities exist for quick repair, and the rail network is sufficiently dense to allow a wide choice of alternative routes. As for the bombing of the civil population, it would be dangerous in the light of present experience to consider this as a war-winning policy against a determined nation.
- 19. Perhaps I have taken a too sanguine view of the ability of a nation to deny its industry to strategic air attack; but it would be unwise to dismiss it purely on those grounds. It is very clear that a nation playing for high national stakes in

a future war will be prepared to expend an enormous effort to minimize the effect of such attack. If this effort is successful we may well find ourselves with a large strategic air force which is denied a large proportion of its natural targets. We shall be off balance.

- 20. Finally, even if the targets are there, the strategic air weapon is a long-term one. An aggressor nation will plan to defeat us before that weapon can become fully effective. If we are not equipped, therefore, with the right type of air force at the outset of a future major war we may not get a chance to strike the enemy effectively before we are defeated.
- 21. These, then, are the reasons why, in my opinion, the correctly balanced air force of the future may be the air transport—tactical air force combination. In any event, such an air force can be applied directly to the point of battle at the very outset of a future war. At the worst we shall have a screen behind which we can build up and deploy our belligerent power; at the best we shall win a rapid victory in the tactical air battle with all the ensuing benefit to the land and/or sea battle.
- 22. If my arguments are correct, therefore, the problem of industrial capacity put forward earlier solves itself. A large proportion of the industrial effort can now be put into building and maintaining a large air transport fleet.

Bases

- 23. I have tried to show that the overall commitment for transport aircraft is not as great as appears at first glance; also that in the future we may be able to devote a much larger proportion of our national resource to the building and maintaining of a large air transport fleet. However, it is clear that even so, within the "foreseeable" future, it will not be possible to move the huge tactical air forces of modern war with their manifold impedimenta, without an astronomical tail of air transport. Apart from heavy installations, the cost in air lift to carry the large amounts of P.O.L., ammunition, bombs, M.T., etc., would be prohibitive.
- 24. We must therefore build up throughout the Empire a series of prestocked base areas into which the whole or part of the tactical air force can move with its running equipment and personnel, and find there sufficient stores and facilities to enable it to operate at intensive rates of effort, at least until the arrival of the first sea convoy from the main base.

Routes

25. An air force strategically flexible between prestocked base areas must have routes along which to move to those areas. This is a matter which we should keep prominently before us



when post-war settlements are being arranged. It would be unbecoming for me to try to teach inexperienced politicians and diplomats their job; but it is clear that we must ensure to ourselves, at least, a safe route over the governing leg between the United Kingdom and the Middle East.

26. This route should run so far as is possible beyond the range of Europe-based fighters; it should have legs of such a length that it can be used by short-range fighters—probably jet-propelled; it should not be confined to the bottleneck of Gibraltar. The post-war disposal of the erstwhile Italian colonies on the North African littoral should, I suggest, be approached with these requirements in mind. Moreover, we should try to reach an agreement with the French as regards the right of military air passage and refuelling through Algeria and Tunisia. While on this subject, I would also suggest that we go a step farther with Lord Trenchard's excellent scheme for inter-air force exchanges with our Western European allies. It may be possible to negotiate with these countries for the setting up of prestocked base areas to be used by our Air Force in the event of another European eruption.

27. The maintenance of our routes in peace does not present any great difficulty. There will undoubtedly be a constant flow of trooping aircraft along the main Empire axes. The practising of our squadrons in air mobility and interchanges between Dominion and Allied air forces constitutes additional traffic. Moreover, the civil air lines should be encouraged to use these routes.

Manning

28. The manning of routes and prestocked base areas is a question which will have to be carefully considered. Whether it is better to keep the routes and bases manned by skeleton staffs with the squadrons and other units carrying their own complete complement of personnel with them; or whether it is better to operate the bases as garages while as few bodies as possible travel with the units (thus increasing the man-power commitment along the routes) is not a question on which a decision can possibly be given here. This would in peace provide the necessary man-management training for officers; give a basis for the build-up of squadron morale; allow for the probably short conscription service of a large proportion of postwar personnel. In war it would solve the problem of the manning of squadrons which moved forward from the base area in support of a successful land campaign.

Defence

29. The protection of our air routes and base areas should be the basis of our Imperial defence strategy. Our base areas should therefore be sited

where land, sea and air forces can be mutually supporting and our command of the sea fully exploited. The present great naval bases throughout the Empire naturally suggest themselves as the logical focal points of air concentration.

30. On the subject of concentration I would like to emphasize that the air flexible—air striking force conception does not connote a solid mass of squadrons concentrated in the main base, waiting to be air transported to any part of the world where our security is threatened. Such a conception is the antithesis of flexibility. Like the Navy, our units should be spread throughout the world; but, also like the Navy, concentration should be so arranged that any units of the force can quickly cohere and converge in a mass whenever concentration may be necessary.

Dominion Air Forces

31. Before leaving the subject of strategic movement, I would like to mention the Dominion air forces. There is a school of thought which, recognizing the necessity for a strategically flexible air force, considers that this can best be attained by strengthening the Dominion air forces.

32. There is something to be said for such a scheme. Indeed, it is in the best interests of the Commonwealth and Empire and the Royal Air Force that the Dominions should, post-war, maintain air forces whose strength is proportionate to their national resources; and that, in so far as is possible, these forces should draw doctrine, design and technical development from the R.A.F. In the event of another major war it will clearly be of immense value if all our air forces are available to fight together with a common technique and common weapons; but I think there can be no doubt that the Royal Air Force must still be the backbone of Imperial air strategy.

33. This island is the head and heart of the Commonwealth, in fact, in man and industrial power, by tradition and by geographical position. Our interests are more world-wide than those of any individual Dominion. We must therefore be able, with our Air Force, not only to come to the aid of our allies and Dominions in need of help, but also to take up our quarrel on our own account. The rather odorous chestnut that we English people fight to the last man of our allies or Imperial troops has never been true. For political and, if you like, sentimental reasons, it must never become true—at least until and unless we cease to be the dominant partner in the Commonwealth. While, therefore, it is sufficient for each Dominion to be proportionately strong in its own sphere, we must be strong everywhere. We cannot, clearly, attain this aim, so far as the air is concerned, unless we practise the economy of force which the strategically flexible air force affords.

TACTICAL MOVEMENT

34. I have used a considerable proportion of the space at my disposal in considering strategic movement. Since this subject is so bound up with air power as expressed in the future design of the Royal Air Force, I think it is right that this should be so. However, there are important functions of air transport in tactical movement which must be considered in any examination of the contribution of the air to belligerent power.

35. When considering air transport in tactical movement, an interesting fact immediately becomes apparent. Whereas in strategic movement air transport is most useful to the air force, in tactical movement it is most useful to the land force. There is thus no basic clash of priorities in large-scale bids for air lift. Once the transport fleet has placed the air force within range of the tactical battle, it can thereafter more usefully serve the interests of the land forces fighting that battle. This is, of course, an over-simplification of the problem and there will always be exceptions to the rule as I have said previously. Air transport, like shipping, must be allocated in the light of existing circumstances and current events. Generally speaking, however, it will be found that the strategic-air and tactical-land conception of the role of air transport will hold good.

36. It may appear that such a useful coincidence is too good to be true. However, there are solid reasons for it. Chiefly it is a matter of distance and opportunity. In tactical movement there is often little to be gained by moving the ground echelons of the air force forward at air speed. The air force cannot operate from bases in advance of the land force and therefore its speed of movement is tied to that of the land force. In addition, relatively static periods in land campaigns are often of long duration, and no need exists during such periods for the rapid and constant movement of squadrons; but during the whole of any land campaign air transport can contribute materially to the army's requirements. The slower and more difficult the land and sea communications within a tactical area, the greater this contribution becomes.

37. To recapitulate briefly, the main functions of air transport in tactical movement are:

(a) To participate in airborne assault.

(b) To move air-transported forces (in tactical movement such forces will be mainly army; but it includes the movement of naval and air force personnel where necessary).

(c) Supply by air.

(d) Evacuation of casualties and the carriage to forward troops of mail and comforts. (This is of ever-increasing importance as the Far East war absorbs more and more personnel).

38. The limitations of air transport in tactical

movement are:

(a) There are items of heavy equipment which it cannot carry.

- (b) It is largely dependent on local air superiority and the absence of heavy flak concentration.
- (c) In large-scale movement of unspecialized troops, aircraft must land for deplaning. In jungle or mountainous country airfields may be a limiting factor.

Principles of War

39. I do not think it necessary for me to enumverate here all the principles of war, and to show by painstaking examples how air transport in the tactical role increases the ability of land forces to wage war in accordance with those principles. The evidence of the Burma campaign with the Arakan Box, the siege of Imphal, Wingate's exploits and many other examples, is there to convince any who may still doubt. Concentration or, as I prefer to call it, cohesion, surprise and mobility, which add up to true economy of force, are all nourished by air transport. The ability it gives to overleap natural and man-made barriers increases the scope of offensive action. The independence it gives on long and perhaps vulnerable land and sea lines of communication increases security and mobility. The sequence of battle is: guard, move, hit. In every phase of that sequence air transport has an enormous contribution to make.

Secure Movement

40. Before leaving the subject of tactical movement I would like to consider a possible future extension of the use of air transport in the tactical battle.

41. Tactical mobility in the land battle is dependent on many factors—means, security and design being the most important. Before the mechanical age, increased mobility was usually achieved by a change in design or an increase in marching power. Thus Marshall Saxe increased his mobility by making his troops march in step. Napoleon increased his by accelerating the marching pace of the infantry from 60 to 120 a minute. Nowadays, however, the mechanization of armies has tended to reduce mobility to a common denominator—that of the speed of the lorry, the tank, the self-propelled gun. The only qualification on the tactical mobility of mechanized

armies is the degree of security which can be given to that movement. Where security of movement has been lost, mobility has been lost and usually the battle with it. The classic example, in this war is, of course, the Battle of Normandy. By full exploitation of air fire-power the enemy was unable to bring his full strength into the battle area and his movement within that area was deadened by the same means. The result was overwhelming victory for the side which retained its security of movement.

42. The lesson to be drawn from this war, therefore, is that fire-power from the air may become so violent that it will produce a slaughter-ous stalemate of the type which the machine gun

produced in 1914-18.

43. If this is so, tactical mobility of land forces may become increasingly dependent on air transport, both in the actual movement of troops and in the elimination of vulnerable land lines of communication. The air is an ever-open flank to those who have air superiority.

CONCLUSION

44. I have tried in this short paper to outline

the contribution which air transport can make to air power as a component of belligerent power; and to indicate the overall national economy of force which the liberal use of air transport can achieve. I have also tried to point out some of the problems and limitations involved. It has not, of course, been possible, in this short space, to make more than a superficial study.

45. I would like to conclude by quoting Slessor's definition of air power. "Air power," he writes, " is the command and control of air communications." In his sense this meant the winning of the air battle to permit our air force to strike at the enemy without interference. However, while his is a sound definition, the developments I have indicated may necessitate giving it a wider interpretation—or rather a different emphasis. Slessor's definition is the definition of sea power with "air" substituted for "sea." The emphasis in sea power has always been on the ability to carry by sea. The fleet is more the guardian of secure sea carriage than a means to strike at the enemy directly. It may well be that air power will rest in the future with that nation which can guarantee to itself, and fully exploit, secure air carriage.

A Plea for the Flying Boat

BY AIR COMMODORE E. L. HOWARD-WILLIAMS, M.C., p.s.a., R.A.F. (Ret.)

In this flying business, with all its prospects and promise, have we fully realized where it is leading us? Aerodynamically efficient, are we operationally stable? As but one instance, we have never yet provided adequate facilities for the scaplane. As another, I question whether our Fighting Services have fully appreciated the full import of air transport, notably over the ocean.

At the outset I admit to being heavily biased in favour of the flying boat, as indeed are most people who have flown both land and sea types. It is not the ducks and teal, the geese and swans, the snipe among us who dislike water, but the crows and vultures, the hawks and eagles, and the albertrii, carrion craft which, you will observe, do not happen to be at home on both land and water.

Ab initio, where has man invariably sought to build his habitat? About water, notably at the estuaries and confluences of rivers and particularly where they flow into the sea. Why? Because it gave him the best of both worlds, those of the land and the water. With what result? Nations all over the universe have centred about their waterways the bulk of their more important cities. And those, which for some reason or other (such as rich coal or mineral deposits) are not so situ-

ated, are linked to these ports by canals and railways and roads, in order the better to develop their fortunes.

The larger of all these cities and towns are already vastly overbuilt. Open space can only be found outside their perimeters, most of it land urgently wanted for development to provide houses and factories. This land is costly and comparatively remote from the city centres.

So what? As the Air Age breaks over us, we find that the ideal sites for airfields, those in the middle of the dense centres of population, are already full of blocks of flats and offices, theatres

and shops.

But airfields are not necessarily airports. It is worth the note that there is water in abundance, often right in the middle of seaports, in lakes and rivers. This condition applies not merely to Great Britain and Australia, Canada, Africa, India and Egypt, but all over the world—where, invariably, the population is thickest, where therefore traffic offers most.

I venture the view that in this we perhaps have a fundamental principle, that where it proves practicable we should use seaports for our transocean air routes. I am somewhat reinforced in my opinion by the tremendous cost, running into tens of millions of pounds, of building long concrete runways (which may become obsolete) all over the world, for the larger types of land aircraft. At a conservative estimate, only a comparatively few ocean-going air liners will be necessary to lift the traffic which will offer. The true cost of every landing they make must therefore be prohibitive.

On the sea those runways have been provided by the Almighty, and can be commanded at a tithe of the initial cost and upkeep of the concrete ones. Is there something basic here?

Hangars and hard standings, service and general maintenance remain equal to both airfield and airport. Transport facilities to the centre of the towns is often the easier and less frequented by way of water, for the distances are generally (admittedly not always) shorter and the time taken to make the journeys is less.

In which a general question arises, one which materially affects our security. Are we going to lag behind anyone else in this matter of air transport, or are we going to lead? Are we going to tolerate a state of affairs in civil aviation comparable to the film industry? So far, on the air routes of the world we have always been backward. Despite the arguments so frequently advanced for our failure, of all peoples, within the Commonwealth we have the greatest field for air development—notably if we keep one eye on the use we can everywhere make of the sea.

Before we proceed farther, let us first examine the main factors in air transport. I see them as:

- 1. Safety
- 2. Reliability
- 3. Comfort
- 4. Speed
- 5. Economics

I firmly believe in Safety First for civil flying, and that any air line which takes an unwonted risk is doomed, a strong argument for the flying ship over transoccan air routes. Reliability follows hot on the heels of safety, as an axiomatic condition of all transport. Who wants to go from A to B, leaving at 1100 hrs. on V Day and arriving perchance on Z Day? There is no point in using the air for commerce unless it can sell time and speed reliably.

Comfort is likewise important. Fare-paying passengers can be very choosy when it comes to discomfort and hardship. Only Government passengers do not mind, and they cannot—much. Ask almost any air passenger about his views upon comfort and you will find that he or she will probably give it a higher precedence than even reliability. The flying ship, with its bulky hull,

provides a greater measure of comfort than does the landplane.

Speed is highly desirable, but I submit seldom at the expense of the other factors. While this may not be true for mails, the majority of passengers consider speed important but not imperative.

You will observe that I put economics last. This does not mean that it is unessential. On the exact contrary. All I argue is that in the practical politics of civil aviation, if you do not give pride of place to the other four factors you will soon have no economics to worry your head about.

In general, then, there is a marked tendency in the first three of the factors in favour of employing sea-going aircraft, although it has to be admitted that 4 and 5 at present favour landplanes in the present sizes. The argument thus devolves upon whether the order I have given is sound, when the question I posed at the beginning becomes the criterion: aerodynamically efficient, are we operationally stable?

What about sea aircraft? What have they done and what types are here or round the corner?

We shall be wise to recognize that the old Empire boats, which sired the Sunderland, have been going for nearly a decade. For years we have been serving the Dominions with them, a policy which in any event seems to suggest itself strongly to an island power.

A "flying ship" best describes the new fourengined, 58-ton Shetland flying boat, Britain's largest aeroplane, in which I recently flew. Capt. Geoffrey Tyssen, Short's test pilot, handled her much as some of us at one time used to fly fighters. I was in the second pilot's seat, and was thus the better able to appreciate the brilliant display of low flying he gave. Time and again we spun on one wing-tip low over the houses and workshops, missing the roofs by what seemed inches, in order to give photographers an opportunity to secure their pictures.

The "skipper," as the crew called the pilot over the "inter-com" (which I had plugged from my flying helmet to a point under the seat) took her off in a stiff 30-m.p.h. breeze within fifteen seconds. After nearly half an hour, of what those on the ground described as one of the best low-flying displays they had seen, we alighted without sensing the touch-down.

You may like to know that the Shetland is highly manœuvrable for a flying ship of this size. The captain took his hands off the wheel in some of the turns low down, to adjust the tail trim to fly hands off in spite of the gusty weather.

As the mock-up discloses, the civil version of this martial Shetland has the acme of comfort on board. It includes a galley and electric heaters, two-berth compartments with folding beds, several lavatories, and a "ladies' charm room," where presumably the fair sex may make up.

Its four eighteen-cylinder clean radial Centaurus engines together develop over 10,000 horse power. For our flight we were lightly loaded, so they only used about half throttle to climb. A notable feature is the space given to the flight engineer on board, with his multiplicity of dials, thus to relieve the pilot of some of his duties.

The Shetland has a wing span of 150 feet, is 110 feet long, has a top speed of 267 m.p.h., and cruises at 184 m.p.h. with a payload of 3.4 tons for 4,650 miles (the distance between London and Bombay). When the range is reduced to 2,076 miles she cruises at 185 m.p.h., and the payload becomes 13½ tons. The loading hatches can take nearly 3 tons of freight and mail.

There are two separate decks, one called the flight deck, in which the pilots and crew are accommodated. The view from the pilots' cabin is exceptionally good. All controls are easy. Many of them are electrically assisted, from the output of the two Rotol-Popjoy auxiliary generating plants, each of which supplies 20 kilowatts at 110 volts A.C. These little "sewing machine" engines light and cook, refrigerate and air condition, clear the bulges and refuel.

There is tankage on board for 6,112 gallons of petrol and 320 gallons of oil. Her wing loading is 49.3 lb. per square foot. Four-bladed de Havilland fully feathering metal propellers, of 15 ft. 9 in. diameter, are fitted to each engine.

Built by Short Brothers with Saunders Roe & Co. responsible for some of the detail design, she was originally conceived by Mr. A. Gouge for patrol and reconnaissance duties all over the world. Two were laid down. A Triton among the minnows, the Shetland bears a marked resemblance to the Sunderland and the Golden Hind flying boats.

As I flew I recalled my flight back from Egypt to Southampton in an Empire flying boat within the day, as long ago as 1937, and realized how the Shetland, when it is delivered to B.O.A.C., should be able to make the journey well within twelve hours.

The new Blackburn project is a six-engined flying ship with a 200-foot span, 148 feet long and cruising at 269 m.p.h. at 15,000 feet, the height for which it is designed. Its top speed is estimated at over 300 m.p.h. and it could carry 160 passengers and 14 tons of freight over short hauls.

America's 72-ton Hawaii-Mars is larger than our Shetland and has done excellent work in service. She also has a wing span of 200 feet, is powered by four 2,000-h.p. engines, and has a top speed of more than 225 m.p.h. They are reported to be building twenty others.

The Americans are now building a 425,000-lb. flying ship, called the Hercules, at the Howard Hughes plant in Culver City, California. She is 220 feet long, 30 feet high, 25 feet wide, and is designed to fly 750 fully armed men across the Atlantic or Pacific. She will cost £5,000,000 and is to be powered by eight engines each developing 3,000 h.p. Her top speed will be about 220 m.p.h. She will cruise at about 175 m.p.h.—slow but sure. A point is that the American project is expected to be flying next year, and we have nothing in her class being contemplated over here.

By the way, it needs to be stated that all the world's best flying boats, including the Clipper and Mars, the Empire and Shetland, owe their basic design to the genius of one man—Mr. A. Gouge, Past President of the Aeronautical Society and now Chairman of the Society of British Aircraft Constructors.

How do flying boats fare when they alight on water and land? I happen to have flown seaplanes fairly extensively over rivers and the sea, much of it fifteen years ago on experimental work in Africa, from the Mediterranean and Red Sea, up the Nile to Lake Victoria Nyanza. I have landed and beached all over the place. By this means we prepared the way for Imperial Airways to operate their boats on the Nile from Alexandria to Kampala in Uganda. I have never seen an accident, either over river or sea or over the land. A Sunderland recently alighted in a ploughed field and took off, without trouble. I have seen seaplanes with their boots on repeatedly take off from and land upon the flying deck of H.M.S. Furious.

This war has proved what flying boats can do, through the superb work carried out with Sunderlands and Clippers over the seven seas. A point which perhaps needs underlining is that this has all been done with most modest facilities at base. No one has yet really properly planned air routes operated by flying boats. When they do so we are going to be amazed at the tremendous economic potential there is in air transport which can alight upon water instead of concrete.

Perhaps the answer is to build our main terminal airports where provision can be made for both land and sea types.

If I were asked briefly to recapitulate the main arguments in favour of the flying ship, with the proviso that the advantages mature with larger sizes, I would give them as:

- . (a) Safer over both ocean and land, in the event of engine failure.
 - (b) Structurally a sounder job.
 - (c) Better for world routes, where large concrete landing strips are often not available.



(d) Nothing like as severely restricted by the need for alighting facilities.

(e) The ports of the world can handle the flying ship operationally and technically.

On the other hand, the disadvantages are:

(y) Cost of construction is higher. The hulls are at present more expensive to build than are the fuselages of landplanes, because they have to be strong enough to take water buffeting. On the other hand, there is a saving in the undercarriage.

(z) Aerodynamically the flying boat in the

smaller sizes is not as efficient, is therefore slower and carries less weight than the equivalent landplane.

To summarize, while a landplane has obvious performance advantages in the smaller sizes, I argue that in the larger sizes, say, over 250,000 lb., the air transport pendulum may well swing in favour of the flying ship, a view firmly held by Mr. Gouge. The advent of jet propulsion and rocket assistance at take-off—to say nothing of atomic energy—tend to make long and very expensive runways obsolete.

The Impact upon International Relations of the New Weapons

Note that the release over Japan on 6th August of an atomic bomb the course of history was changed. Nothing in the relations between sovereign States can ever be quite the same again. Equally changed will become the sources of power for industry, transport, and domestic amenities once the problem of releasing atomic energy gradually, instead of explosively, has been successfully solved.

One result of this portentous discovery, the means of making an explosive more than a thousand times as powerful as anything hitherto unknown, is an immense addition not merely to the striking power of bombing aircraft but, especially, of the VI and V2 robot weapons. The effect of this menacing consequence upon the relationship of each State to every other must now be thought out, and the new situation, whatever it is, squarely faced. Obviously an immense impulse is given towards the creation of a World State; but that will take time. Fortunately we have already, in the throes of creation, a new extra-national United Nations Organization and a World Security Council acting under it with the duty of preserving world peace. That Council can now be armed with the most potent weapon ever discovered by man.

The new Council would naturally have an urgent task in the control of such weapons as the flying bomb (V1) and the rocket (V2). That urgency has grown mightily in recent days through the discovery of the uranium explosive—the atomic bomb—which can arm either. Its field of action will grow ever greater in the days to come, for efforts will at once

be bent towards the use of the uranium reaction in order that it may provide a greater source of mechanical power than any we now know.

President Truman has spoken encouragingly of this possibility and of a time not far off when atomic energy may prove able to supplement the power derived from coal, oil and waterfalls, though not yet awhile at a cost to compete with them commercially. Much the same point of view was taken in a special article in The Times on 8th August, 1945: "To-day, he who is plaguing himself about the exhaustion of the coal and oil fields of the world in the next 100 years can, indeed, have few genuine cares." In so far as success crowns these efforts so, with this new fuel, the potential range of operation of both V1 and V2 will be immensely increased. We have to face the overwhelming likelihood that any spot on this globe will be capable of being reached by either weapon from anywhere else, and their potentiality for destruction will be fully a thousand fold greater than that of the rudimentary forms of these unpleasing devices which we knew in 1944 and 1945.

It had long been obvious that forms of warfare would become more and more mechanized. That in itself presented no terrors to humanity, for the more the human body could be protected by armour and transported without strain, the fewer the casualties would be. Britain was as deeply engaged in the second World War as she was in the first, and it lasted one and a half years longer, yet the casualties among our armed forces, including the Air Force, were less than a third of what they had been in the first. And this favourable ratio is little affected even when all the civilian casualties in Britain are included. From the experience of those wars it would have been natural

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to expect that the greater the extent to which machines replaced men, and the more that armour was employed to protect both, the less deadly to life would warfare become. Yet in the last days of the war now ended we have learned that this benevolent effect need by no means continue, for in the use of entirely unmanned weapons, V1 and V2, even without the employment of atomic energy, there appeared the prospect that a rise in the rate of civilian casualties might hereafter overshadow completely the lower casualty rate among those in uniform. Indeed, we should very probably have discovered this for ourselves in the winter of 1944 and the early months of 1945 had not the German time-table been thrown into confusion by the D-Day invasion, which overran their French bases, as well as by the ceaseless watch and alert action of the R.A.F. in the months before. It was, we are told, the German aim to despatch no less than 200 flying bombs every hour against London—instead of the 100 or so a day that we experienced for a few months. As it happened this V1 effort, reduced as it was, dwarfed the scale of the attack by its successor the V2, of which those despatched hardly exceeded a tenth in number, and many failed to reach this country at all. It is true that when the rockets did arrive they caused twice as many casualties per ton of explosive; but that was not because of any higher efficiency but solely because they came faster than sound and the victims had little warning to cause them to seek shelter.

One of the reasons why the impersonality of the robot weapons proves so terrible a menace is that defence measures are difficult to devise. These weapons are "throw-away" devices—never to be used again. In contrast, our bombing airplanes made on the average some thirty attacks apiece before, for one reason or another, they could be used no more. And in the war against Japan the number of attacks made during the life of each bomber must have been even higher. But air-crews, being men, of whatever nationality, have a nervous system which can be affected by the threat of gun or rocket fire from ground or air. They can in some cases be deterred by fright. Moreover, they need to be numerous enough for their task of piloting and guiding as well as defending the aircraft out and home, and so present in the aggregate a large target for lethal attack. The flying bomb presents but a small lethal area and is incapable of being frightened or scared from its task: on the other hand, semi-intelligent as it is, it is not intelligent enough to take avoiding action against even

obvious dangers and so is the more readily shot down either by the A.A. defence on the ground or by interceptor aircraft. Indeed, one of the mysteries of the German plan is that they should have chosen such a foolish flying speed for V1 as 330 to 360 m.p.h., just the speed at which it could comfortably be intercepted by our faster fighters. Had they put up the speed by as little as a fifth, it would have considerably reduced the 75 per cent. casualty rate to which, in the end, they became subjected.

The flying bomb was no novelty. All that was new was its use in time of war. Numbers of them were made for experimental purposes in America during the first World War. The fact that such experiments were made does not mean that had that war continued longer, they would necessarily have been used operationally. The purpose of the experiments was to discover their potentiality—and no doubt their cost—and the next step would have lain with the War Staffs of that day, who would have the duty to decide whether it was sound policy to use them or not. Any attack they made would be bound to be somewhat, perhaps largely, indiscriminate, and against their use there would have been both moral and material arguments. The moral argument is too obvious to need discussion, but on the material side it would be a question whether the humanly directed bomber would not be more efficacious in relation to the man-hours consumed in production —for the losses of the flying bomb would, in the nature of the case, be 100 per cent., as against 5 per cent. or less with the bomber. Opinion in the R.A.F. was certainly averse to their use and no doubt that opinion was wise: nevertheless, as we have seen, a bandit Power like Germany was ready to use them and they might conceivably be used again—if the chance were given. Certainly, if Germany had deluged London to the extent that we now know was intended, it would have had to be evacuated. But that would not have ended the war; though the assiduous and accurate use of manned bombers might have gone far to do so.

The flying bomb of 1918 was not unlike its 1944 successor in respect of size and expected range. The chief difference was the use by the Germans of one of the modern jet-propulsion units, and a most ingenious engine it was. Some 700 h.p. was produced from what has, somewhat irreverently, been called "a drain pipe." It was not expensive to produce. Indeed, the whole weapon with its ton of explosive probably cost no more than a light car: whereas according to an estimate by the Ministry of

Aircraft Production the rocket, which followed, may well have cost as much as one of our own Spitfires. The flying bomb was very extravagant with fuel for, despite its tiny size, it used just about as much fuel per mile as a full loaded Lancaster bomber: nor was it speedy. Indeed it looks as though its German designer must either have been singularly insensitive to operational requirements, or else, which is more likely, was baulked by some technical hitch which could not be surmounted in the time imposed by authority. This perhaps made it necessary to fit the smaller engines which made high speed impossible. Given time it would have been easy to have endowed it with higher speed and greater range, for any bomber that can fly the Atlantic could be fitted with an automatic pilot, filled with explosive, and despatched over that ocean—hence a striking range measured in thousands of miles is quite possible. But the path it flies is subject to the vagaries of the weather, and it could have no accuracy of aim unless it were continuously guided from a radio station at a home base, or from an accompanying aircraft. Radio control is, however, easily jammed, or deceived, and the nearer the weapon to its target, the truer this becomes. With the new use of uranium as the explosive, extreme accuracy of aim is less important, but even then it would be no more than a terroristic weapon—which devices, though a nuisance, do not win wars. As Lord Cherwell said in the House of Lords in May last: "In assessing the value of any missile, we must take into account not only the damage which it can do if it hits, and its range, but also its chance of hitting a worthwhile objective, and the effort in man-power required to produce and project the missile. . . We must avoid an expensive missile of which only a minute proportion hits the target."

THE ROCKET (V2)

It was after the loss of the French coast in August, 1944, that the Germans brought into operation their long-range rocket. This was about five times as heavy as the flying bomb but carried no heavier charge. Nor were the operational ranges very different. What the Germans expected of the rocket is not yet clear, but it seems that they counted on its being almost impossible to intercept and that it flew so fast (about a mile a second) that no warning was given of its arrival. Of its starting weight of some eleven tons, as much as eight tons was fuel, the warhead one ton, and the balance structure and mechanism. It stood on its tail for starting and was fired with an upward push from its powerful jet of exhaust gases with a force estimated to equal that of five express railway locomotives. The fuel burnt out in about a minute, by which time the rocket had attained a height of some twenty miles, the initial vertical path gradually changing, by the action of internal mechanism, to an angle of 45 degrees or so. At that height almost all the Earth's atmosphere had been left behind and the projectile proceeded on the parabolic path so familiar to the schoolboy. A height of about sixty miles was reached, and the range proved to be about 200 miles or a little more. Many failed to function rightly and fell back on the Dutch coast, to the great hurt of The Hague and other towns, and many fell into the sea. Oddly enough one of the latter was seen by an observer as far away as London to start on its path from The Hague, an observation which may seem surprising, but the atmospheric conditions were unusually favourable. The time was half an hour before sunrise on a late autumn day in 1944. The observer, chancing to glance from an easterly window, was astonished to see, thanks to a conveniently placed gap in the skyline, the bright ascending trace of a V2. Plotting the observed bearing showed the line to go straight through The Hague, and inquiry in the right quarters confirmed that this was a long view of a V2 starting on its westerly course—in this case happily ending in the sea. The exhaust trace brilliantly lit in its upper part by the still hidden sun stood out against the dusky sky and so was seen to its extreme height of twenty miles.

It is natural to ask whether such rockets could be made to travel great distances. The answer is certainly yes, for it is evident that if the warhead were replaced by a smaller rocket -say a tenth of the size and weight-to be fired when its "parent" had reached its full speed, the "child" would obviously add a further mile a second and so reach a double speed—and therefore a quadrupled range. The range would really be more than quadrupled since the curvature of the Earth would be in its favour. The warhead of the "child" would, of course, be very small, only about 200 lb. But if this process were again repeated so that a "grandchild" resulted, the range should suffice for an Atlantic crossing. True, the warhead would then be so small as to be ineffective (at least with the explosives hitherto in use) unless the "parent" could begin life in a vastly larger size—which would make the whole project so gigantic in cost as to be of little operational utility. Nevertheless it could no doubt be done. Moreover, it could be made exceedingly accurate in aim, since, the flight path being almost entirely outside atmospheric disturbances, all that would be needed would be to guide its initial path aright. That could be done with great precision by radio methods, and since this would only be required during the first minute or so of flight, the intended target country might well be so far away as to make radio jamming entirely impossible, unless some friendly radio assistance were given from a country nearer the place of origin. Thus, in case of an attack on the U.S.A. from Europe, the necessary assistance could, and no doubt gladly would, be given from Britain.

'FUTURE DEVELOPMENTS

So much for these weapons as we have hitherto known them, but they are capable of considerable development, both mechanically and chemically. The flying bomb can be made speedier—so speedy that no manned aircraft could catch it—and could have a range running into thousands of miles. The rocket can have its range increased to a similar extent, though only at a great increase in size and cost unless some new form of fuel is obtained. Both can be made far more menacing by the use of more effective explosives. It is here that the discovery of the secret of the atomic bomb opens wide possibilities.

With so many other problems affecting human life and happiness requiring solution, it was not surprising that mankind has viewed with some apprehension the prospect that it might have to face the appalling complication in life which the release of atomic energy would inevitably bring. At a meeting of the British Association, held a few days before the beginning of the recent war, warning of the danger was given in a Presidential address and the hope expressed that there might happily be time to solve certain other pressing problems before this new one was thrust upon us. But time has not been given.

At present the energy hitherto so closely and securely locked in the nucleus of one of the less common isotopes of the uranium atom can be released, but only in an explosive rush. uranium is to be not only an explosive but a fuel, control there must be in the liberation of its immense store of potential energy, so that it may emerge in a modest, regulated stream, rather than in the great explosive burst of the atomic bombs which brought the war in Asia to its sudden end. We need a patient release, not a vehement one; but vehemence is easier to exhibit than patience, and the latter may not be simple to ensure. Years, it may be, will pass before this further more difficult secret is unlocked. But even now by the use of the uranium

bomb the powers of V1 and V2 are vastly increased, perhaps a thousandfold. And when it is discovered how to use uranium as a fuel also the menace will be greater still, especially in the case of the rocket, the more dangerous, because more accurate, weapon of the two.

A rocket so armed is likely to be "Enemy No. 1" of any World Security Organization, for batteries of them could be aligned from one centre on neighbouring capitals and be fired without warning by some new Hitler pressing a button in his madhouse Chancellery. That must be stopped. How to do it is the problem.

THE GRAVE ISSUE

What is at stake is the happiness and well-being of the entire human race. We have Mr. Churchill's grave words: "This revelation of the secrets of nature, long mercifully withheld from man, should arouse the most solemn reflections in the mind and conscience of every human being capable of comprehension. We must, indeed, pray that these awful agencies will be made to conduce to peace among the nations, and that instead of wreaking measureless havoc upon the entire globe they may become a perennial fountain of world prosperity."

Mankind is like a child having in its grasp, for the first time, an exceedingly sharp knife. What the child will do with it will depend on his character and disposition, and even more on his maturity. If very young he may well do himself, and his fellows, mortal harm—unwitting of his own unwisdom. Is such a child more immature than mankind itself? Sir James Jeans thinks not, for he tells us how exceedingly youthful is the entire human race. Comparing the age of the earth with the height of the Nelson Column, he has shown that the years of man's existence would be no more than the thickness of a coin and his few thousand years of civilization that of a postage stamp. There is little of maturity here. As to character and disposition we have lately seen how little there was to prevent the rise of the Nazi type. Potential Hitlers probably still exist. Someday, it may be, eugenic control of population will minimize, or even prevent, the birth of such misfits: our present hit-and-miss arrangements if followed by racehorse breeders would surely bring them to speedy ruin.

This time, providentially, we have escaped, though the new tools that helped us can, without wisdom, create their own peril. And however lacking in maturity we may be, we ought surely to possess enough confidence in ourselves not to look to Providence to come to our aid

every time we get ourselves into trouble. The most loving father thinks it wise to let his children essay the management of their own affairs once they are past infancy. And we are growing out of infancy: city States have merged into the group we call nations, and now it is for nations to group themselves, for certain vital purposes at least, into a world organization. To the latter end a heartening first step has been taken at San Francisco.

A first requirement is an all-embracing World Security Organization to control all such weapons and their sources of supply. No one must be allowed to prepare or construct such devices; it will be the duty of the Security Organization to keep meticulous watch that no such effort can escape detection. Mr. Churchill has told us that the Canadian Government has already undertaken new surveys and explorations in search of uranium ores, and that these on discovery will be Government controlled, and ultimately used under whatever arrangements are made for controlling the release of atomic energy in the interest of mankind.

It happens fortunately that (for the present at any rate) huge apparatus, and workshops to match, are requisite for the construction of atomic bombs. President Truman estimates that those built in the U.S.A., for use in the war, cost the huge sum of £500 million sterling. So long as that is the scale of things, it should not be difficult to detect any attempt by a bandit Power to build such weapons; once detected, they could easily be destroyed, not necessarily by calling in our new uranium ally, but by any flight of ordinary bombers, or even better—as causing less accessory damage—by landing troops from troop-carrying aircraft. Resolute paratroops would make short work of any such banditry and be a mode of deterrent action more agreeable to times of peace. But more drastic means would lie in the background.

This solution, involving as it does the surrender to a new extra-national organization of a whole form of technical activity, though leaving the Universities free to pursue their high task of widening the bounds of human knowledge, is bound to excite misgiving among those who cling to every aspect of national sovereignty —but the change is one to which we are driven by events. Small States, as we have seen, are quite unable to preserve their rights when their greater neighbours are at war; their existence as completely sovereign entities is, moreover, a hindrance to their neighbours' powers of defence and in the end a menace to their own existence. New inventions have made the whole world smaller and international boundaries as at present existing an anachronism. It is for statesmen everywhere to keep in step with these developments and not to behave as though we lived still in some bygone age. As Sir Henry Dale, the President of the Royal Society, has lately said: "The release of atomic energy, now an accomplished fact, can either destroy civilization or immensely enrich its possibilities; the choice is clearly before mankind and those who guide its destinies. It is everybody's concern and the statesman's supreme responsibility."

Is there any alternative to such a plan? Could for instance the Anglo-American world act alone if the rest of the world failed to agree? The answer is certainly yes, but the degree of security would suffer. And in the improbable event that even this limited action should prove not possible, could the British Commonwealth act alone? Again the answer is yes, though rather more doubtfully, for the degree of security attained, though welcome, would be far from complete; schemes that extend to only a part of the world though better than nothing very much better than nothing—cannot give us what we really require. The only solution which can satisfy the world's needs is a World Security Organization in control of fully equipped research establishments and factories—preferably in the U.S.A., where they now are—at the service of all, as part of what would be in certain respects a sort of World Government. No solution short of this can really meet the urgency of the situation which the enterprise of scientists has created. Need statesmanship always lag behind the needs of this increasingly scientific age? Must it be for ever purblind, and leave the world exposed to alarm and doubt, and in the end to that irrational state of fear which so easily leads to insensate action?

The administration of these matters may, it is true, prove difficult owing to their technical complexity. But technical affairs, even if complex, can be understood, at the cost of some trouble; though naturally they are more easily followed by those who have sympathy with the scientific attitude to life. Perhaps this is due in part to the reluctance of our elected rulers to equip themselves with a sufficient measure of scientific knowledge. But if the World is to be wisely guided in the conditions which exist today, a change is necessary. If those in authority find such things hard, may they not be asked, with great respect, to give way to those who would not?

The suggested solution to the overwhelming problem now facing the World in its international relations may be thus summarized:

(1) The transfer to the Security Council of

the United Nations Organization of all authority over the supplies of uranium ore (or of any other ore which the future may show to be capable of similar use).

- (2) The transfer to that Council (acting perhaps through some Trustee Power such as the U.S.A.) of control of all laboratories, factories, and experimental stations which may exist, or may be brought into existence, which, in its opinion, are capable of being used for the large-scale utilization of atomic energy.
- (3) The equipment of that Council with such

scientific and technical staffs as are necessary to enable it to carry out the above functions, and to provide the necessary intelligence and inspection services to ensure that the Council shall be advised betimes of any infringement of these regulations.

(4) The placing upon that Council of the duty to assist in every way in the development of atomic energy as a source of useful power, so that its discovery shall "conduce to peace among the nations and . . . become a perennial fountain of world prosperity."

H. E. W.

The Atomic Bomb

[Speech by Lord Cherwell in the House of Lords on 16th October, 1945, in a debate on a Motion by the Earl of Darnley, calling attention "to the crisis in human affairs created by the atomic bomb and its future developments, and to consider the following ultimatums that it has presented: (1) That a third world war, or even an attempt to stop war by force, may disintegrate humanity beyond repair and possibly even the globe that it inhabits, (2) That it will be impracticable if not impossible to keep the secrets of this weapon and its successors, maintain adequate supervision of its manufacture, or foresee or prevent its use."]

LORD CHERWELL: . . . Nobody should minimize the perils of the present situation, but harm rather than good is done, I think, by exaggera-

ting them.

I will, therefore, address myself in the first instance to the particular point which, in view of the noble Earl's hereditary dislike of explosions, seems to cast a shadow over his mind. This is his artitiety lest experiments in nuclear fission may result in the detonation of the entire planet on which we live. Perhaps I should apologize for using the word "nuclear" instead of "atomic." Faulty though it is, I suppose I should endeavour to conform with the phraseology to which people have been accustomed. But all chemical reactions from the process of digestion to the explosion of gun cotton consist in redistributing or rearranging the electrons which form part of the atom. Every chemical process therefore is atomic. The big new step which has been taken is that we have now learnt to operate on and to exploit the heavy nucleus around which the electrons revolve. Just as the sun contains vastly more energy than the planets, the nucleus contains far more energy than the planetary electrons. And nuclear reactions are correspondingly more violent. Though the totally incorrect but unhappily familiar adjective "atomic" has, I fear, become too universal to be eradicated, I hope I may be excused if I use the correct word "nuclear."

Now, first of all, as to the question of the detonation of this planet. I have no wish to

weary the House with what might almost develop into a lecture on nuclear physics, but to relieve the noble Lord's anxiety I must just say this. The most stable nuclei are those composed of about fifty to seventy units of mass; that is to say, those in the iron, copper region in the periodic table of the elements. If the heaviest elements disintegrate, energy is set free. The lighter elements on disintegration would absorb energy. In order to cause a heavy atom to disintegrate, its initial energy must be raised to a definite threshold level; very much in the same way that a fire must be lighted by a match. If, and only if, the particles produced in such integration are of the right type and sufficiently numerous and have enough energy to start off more than one neighbouring nucleus, can detonation occur. For what we call an explosion only happens if one nucleus sets off two, these two set off four, four eight, and so on. The threshold value of energy which has to be reached in order to cause disintegration is so high in all except the heaviest elements that the particles produced are not able to cause neighbouring nuclei to detonate. So, only the very heaviest elements are likely to be of use for this purpose.

Now the surface of the globe is composed as to 99 per cent. of light elements. Power cannot be produced by splitting these nuclei. On the contrary, they must be made to combine if energy is to be set free. This is a much more difficult process than getting them to disinte-



grate. Even in the inanimate world it is much easier to create dissension than harmony. To overcome the strong mutual repulsion of nuclei and to force them into such close association that they coalesce requires pressures and temperatures which occur in the interior of stars but which could not be produced accidentally over a large region of the earth's surface. I think. therefore, that the noble Lord's apprehension lest this planet explode as a result of experiments in nuclear disintegration may really be dismissed. The noble Lord, of course, may retort that it is easy and safe for me to speak with such confidence since it is plain that there will be nobody to reproach me should my prophecy be disproved. But I can tell him that there is really more in it than that. When he says that five years ago no one ever envisaged this development I would point out that it is almost five years ago that I recommended that research into these matters should be accelerated.

I do not set up in life as a prophet, least of all in my own country. But I do feel that there are certain facts known in science which will be true even five years hence. Now there is another point I would like to mention. Just as it is a mistake to exaggerate the dangers inherent in nuclear disintegration, it is, I submit, foolish to exaggerate the potential benefit. I have frequently seen it stated that thanks to the power which can be developed from nuclear energy the world will soon enter into a period of wealth and prosperity which will dwarf our wildest imaginings. Frankly, I hold this to be a complete misreading of the situation.

Nuclear fission so far shows no sign of producing any sort of energy in any immediately utilizable form, except heat and not very high grade heat at that. Power no doubt can be produced from this and there are a number of special applications which can be imagined for which it might be very useful, despite the difficulties of shielding any living being which approaches these sources of energy from the very dangerous radiations inevitably given off in the process. But what seems to be forgotten is that the cost of power is merely a small item in the national budget sheet. Only in a very few industries does it form a major feature. In most processes affecting the comfort and happiness of humanity it plays but a negligible part.

The cost of coal to cook our food is trivial compared with the cost of the food itself, and nearly one-third—amongst poorer people one-half—of the nation's expenditure is on food. The quantity of electricity required to drive a sewing machine is negligible compared with the cost of a suit of clothes. One-eighth of the national expenditure goes on clothing. The actual power used

in making bricks and mortar and putting them in position on houses is trivial in comparison with the cost of the house—nearly one-eighth of the ordinary man's budget. We must also not forget the cost of distributing power. The cost of coal needed to produce electricity is only a small part of the cost per unit to the consumer. If by some miracle it were possible to have a couple of electric terminals in the heart of England from which to draw unlimited supplies of electricity (power in its most convenient and flexible form) at no cost whatsoever, it would not make a great deal of difference to our well-being. At the very utmost, supposing we got nuclear energy for nothing at all, and so far there seems little prospect of this, we might save the value of the coal produced in this country and this, as everybody knows, is only a few per cent. of the national income.

I think there is some danger in people imagining that a new era of prosperity is round the corner, merely because a new source of power has been discovered. That, in my view, is false. The idea that nuclear energy will at once revolutionize society and enable us to live a freer and happier life is, in my view, just moonshine. I am far more impressed by the real dangers with which humanity is confronted as a result of the progress in exploiting these forces of Nature, but it is perfectly true, as the noble Lord has said, that we are only at the beginning of the story and there is very little doubt that enormous improvements in the power and efficiency of the bombs to be used will be made. If we enter upon an arms race with the nuclear weapons culminating in a world war, the end of civilization, as we know it, is almost inevitable. I do not think that anyone will disagree with the thesis that the most important thing in the world to-day is to find some way of preventing such a race. How are we to set about it? Here again it seems to me that we are confronted with a terrifying welter of loose thinking. I have seen it stated by one right reverend Prelate—I do not think that he is a member of this House-that "the formula should be burnt." This betrays a degree of misapprehension which renders discussion extremely difficult.

Anyone who has followed the very ample publications on these things must know that there is no secret or formula to hand over. For the last six years every physicist in the world has realized that in principle nuclear energy could be released from some of the heavier elements and practically all of them knew, broadly, how to set about it. Equally, every physicist realized that this would be a gigantic undertaking, many thought too immense to be practicable; that there would be innumerable snags, difficulties and teething

troubles to be overcome, that a host of makeshifts and compromises would be needed and that a constant stream of improvements would emerge. Everybody realized that there were a number of ways in which the crucial materials could be made, each with its special difficulties, and that colossal efforts in man-power would be required to design, lay out and build up the plants necessary if success was to be achieved. But as to a formula or a secret which should, or should not, be divulged; it is just as nonsensical to talk about this as about the secret of making internal combustion engines. Everybody knows that a mixture of petrol and air explodes if ignited and it is obvious that this phenomenon can be used to drive a piston and develop power. But it is a long step from there to making a Rolls-Royce engine.

When this is realized, surely the absurdity of slogans like "Share the secret" must be obvious. Everybody knows that you cannot "hand over the secret" of making even relatively simple things like aero engines. Why, even if you hand over the engine complete the users have to be trained in manipulating and maintaining it. I do not know whether those who talk about sharing the secret really mean that a host of technicians and engineers from each of the various countries of the world should be entitled to come for a complete course of instruction and training, in all the complicated processes which it has taken hundreds of scientists and thousands of engineers years to develop. The whole thing is really meaningless.

Surely we are all agreed that the thing we must strive to avoid is an armed race in making atomic bombs; but is the best way to prevent a race to get all the competitors lined up level behind the starting gate? Nothing I should have thought could be more calculated to produce the very thing we wish to avoid. I should have thought that that was the best way to start it and not stop it. I am often told that scientists are like people who have put a box of matches into the hands of a wilful and ignorant child. That may be, but is the remedy to make sure that every child in the party has just as good a box of matches as its neighbour? Nobody would desire to keep these weapons in the hands of one nation or a group of nations in order to dominate or dictate to the world. At least, I am sure very few people want to, because, quite apart from the moral aspect, such a plan would be utterly futile. As the noble Lord has said, it is plain that any nation with adequate industrial facilities could work out the technique.

I submit that what we must do is to strive to find some way of preventing an armed race developing and obviating conditions which will cause a war, with these terrible weapons, to break out. If and when this is done, then will come the time to hand over all the technique to the body which can be trusted to use it only in the interests of humanity. Some people say that this is quite simple; all we need do is to hand everything over to the United Nations. I do hope that members of this House will approach this question a little more realistically than that. Catchwords of that sort really lead nowhere. We must try to think out what such a slogan implies. Presumably the idea is that only the Security Council of the United Nations should be allowed to use or make nuclear explosives, that they alone should be allowed to have them so that they should have a weapon with which to enforce their decrees against recalcitrant nations. But where are the United Nations to set up their factories, and how are they to be sure that some recalcitrant nation is not secretly producing some more powerful nuclear explosives of its own? At the very least they will have to enforce complete and rigid inspection over every square mile of the globe. Otherwise there can be no certainty that this weapon is not being produced in secret somewhere.

Then they must have some region safe against a coup de main where they can make and store these super-bombs. They must have some means, say an air force, with which they can project these missiles on to the sensitive points of any refractory nation. That implies air bases all over the world from which they can act and which are immune against sudden attack by any potential agressor nation. Finally, perhaps most difficult of all, they must have the will power to put into force sanctions rapidly and indeed ruthlessly against any nation not complying with the rules. Whether or not something on these lines ever can be, or ever will be, worked out I cannot say, but unless some concrete scheme of this sort can be developed it is worse than useless, it is positively mischievous, to talk as if there were some simple panacea like handing over control to the United Nations, which would solve all our problems.

It has been said, for instance, that we cannot exclude any nations from the advantage of making power by nuclear methods and that therefore we shall have to allow plants in all the countries of the world to be built, which can, of course, be turned over to making bombs. There is something in that, but as I pointed out just now cheap power is a small item in the cost of national production, even in highly industrialized countries. To forego this advantage may be a small premium to pay if this will prevent intensive bombing by nuclear bombs. Yet some people say that we must teach everybody how to make nuclear bombs as a sign of confidence. This is an

argument I have always been taught to distrust. Supposing these developments had taken place ten years earlier, would anyone really have been prepared to teach Hitler all about how to make these dreadful weapons in order to show our confidence? And is the world really such a dreadful place to-day that we should hasten to multiply a hundredfold the sombre powers of destruction already available to everybody?

Some optimists believe that if we were to agree to outlaw atomic bombs that would be sufficient. They comfort themselves by pointing to the fact that gas was not used in this war. I submit that this is a false analogy. Does anybody really believe that Hitler refrained from using gas because he had promised not to? In no other case did he allow his solemn engagements to interfere with what he conceived to be his interests. The reason he did not use gas is simply that gas is an extremely ineffective weapon against civilians, who can walk away from the infected areas until the danger has blown over, and is not much use against soldiers unless they are confined to a very restricted space. In the early days of the Normandy beach-head it might have been useful, but by then the German bomber force had been reduced to such a degree that effective action was no longer possible, whereas retaliation might have been overwhelming. Do not, therefore, let us be deceived by the hope that some convention to outlaw atomic bombing is all that we need to save us.

I wish I could believe that the answer propounded by the noble Earl who opened this debate was practicable—that there was any hope of abolishing past, present and future grievances by general co-operation or adjusting unfair variations in the necessities of life by common consent bereft of recriminations, penalties, territorial changes and so on. Grievances arise just because nations, groups or even people differ about what is fair. If the world consisted of saints we might avoid recriminations and penalties, but I fear that catastrophe may overtake us before such a fundamental change in human nature has occurred. I am entirely in sympathy with the noble Earl's ideals, which have been preached throughout the ages by founders and protagonists of the great religions of the world, but great as is my respect for the lofty eloquence of many members of His Majesty's Government, I am a little anxious about the wisdom of putting our trust in their doing in five years what Confucius, Buddha, Zoroaster, not to mention St. Paul and St. Francis, have failed to do in twenty centuries.

Do not let us be led astray by slogans and wishful thinking into believing there is an easy way out. We must face the difficulties and really try to find a genuine solution. But it must be a

genuine plan worked out in detail, not just a vague idea which can only succeed if all the nations of the world always play the game. I do not pretend that I myself have been able to think out any scheme which could be regarded as practical and effective—and it must be both—but if any nation or body put forward such a proposal I feel sure that His Majesty's Government, and for that matter the American administration, would be relieved and delighted. It is the difficulty of finding any even approximately watertight plan that makes the outlook seem so grim to anyone who thinks deeply about this question instead of skimming light-heartedly over the surface.

In learning how to manipulate nuclear energy man has taken the greatest step in the control of the forces of Nature since his half-human ancestors learnt how to make and maintain fire. Just as fires can be, and in the early days often were, utterly destructive of life in the forests and on the prairies, so this new power may be utterly destructive of all that has been built up in a thousand generations. Man's moral stature has not grown with his intellectual stature, or rather perhaps it would be fairer to say man's institutions have not advanced as fast as his power to harness the forces of Nature to his will. For I am convinced that if a vote could be taken the world over as to whether there was any object in the world for which it was worth while to start an aggressive war, not one man in a hundred would say yes. Unfortunately, as we have recently seen, modern developments make it so easy for a few vicious leaders to mislead, control and dominate great nations that the natural decent human instincts of mankind are no adequate safeguard.

Man is indeed a strange mass of contradictions. Here we are, microscopic creatures scuttling about on the surface of a minor planet circling round a second-rate star in one of half a million galaxies. In some ways our minds are so capacious and penetrating. We can judge the weight and composition of stars whose light started before man appeared on this earth. We can unveil the secrets of the nuclei which are so small that if we could put together as many of them as there are drops of water in the ocean they would together scarcely form a particle visible with a microscope. Yet we seem to be unable to order our own affairs so as to avoid exterminating one another. Perhaps the threat of this new weapon may in the end bring home to the various nations the overriding need of finding means, at no matter what cost and sacrifice, of reaching agreement without resort to force. We must pray that this will be achieved in time, for if it is not then the end of civilized life on this planet is at hand.





A CATALINA OVER GIBRALTAR

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Day of Reckoning

BRITISH ECONOMY AND THE END OF LEND-LEASE

[Reproduced from the October issue of "The World Today," published monthly by the Royal Institute of International Affairs]

"ODERN civilization is based on a world economy which functions through a system of multilateral trade of a specific pattern that embraces the whole world. The recent war, and particularly the reduction of British overseas investments, is likely to modify that pattern in the future. But the need for a world pattern of multilateral trade will remain as long as climates and geological deposits continue to vary from one area to another, as long as the factors of production are unevenly distributed over the face of the globe.

"Distortions of the original pattern, whether caused directly by the war, or by measures of commercial policy, must cause friction and may threaten the whole functioning of the system and the economic welfare of States dependent on it. Some distortion is obviously unavoidable; but only if commercial policy takes account of the universality of the pattern and of the interdependence of the various trading areas will a smooth transition from the restrictions of war to the expansion of peace be possible."*

The United Kingdom is irrevocably committed to living by overseas trade; its national economy is as truly part of the world economy described in the above extract as the economy of New England is part of the national economy of the United States. Our percentage share in the total of world trade was in 1938 of the same order of magnitude as that of the United States, and our dependence upon that trade correspondingly greater, as our internal resources of territory and population are so much smaller.

In the decade between 1928 and 1938 "every country which possessed colonies or other overseas territories was tending to direct a greater proportion of its trade to them," and this was true of the United Kingdom. The recovery in the period following 1932 was greater in the countries of the "sterling area" than in others. That world-wide system of settlement of trade balances which had accompanied the growth of a world economy from 1870 onwards was breaking down. "Apparently the system of multilateral trade continued

This then is an undertaking to reverse a tendency which, not quite justly, happens to be symbolized in American eyes by the Ottawa Agreements. It is to our interest to return to a more general multilateral system if the necessary conditions for the restoration and functioning of such a system can be satisfied. If those conditions are not satisfied no amount of good intentions will avail. We shall follow the course which had developed by 1938, and take our place in some less comprehensive system, handicapped by the fact that the European economy has in the meantime been pretty thoroughly ruined, and by the permanent difficulty of Canada which belongs both to the American system and to ours, and may be torn between the two.

These were the alternatives put by Lord Keynes at his first press conference in New York at the beginning of the present negotiations. They are true alternatives in the sense that the second and more limited system could no doubt be made to work, and probably to yield us something like the war-time standard of living if we are driven to it. But the first alternative is far preferable both as making

to exist; in reality it did not function. . . . The restrictions imposed were . . . largely discriminatory and for this and other reasons tended to balance transactions with each country separately rather than in the aggregate. Multilateral trade was thus reduced and replaced by bilateral trade.† This was the era of Dr. Schacht's bilateral agreements and exchange controls, and this is the process which the United Nations are pledged to reverse if possible. These are the discriminations referred to in Article VII of the Master Lend-Lease Agreements, governing the conditions on which lend-lease aid was granted and accepted. "Agreed action . . . open to participation by all other countries of like mind, directed to the expansion . . . by appropriate international and domestic measures of production, employment, and the exchange and consumption of goods ... to the elimination of all forms of discriminatory treatment in international commerce, and to the reduction of tariffs and other trade barriers."

^{*&}quot;The Network of World Trade," p. 10. Geneva: League of Nations, 1942.

^{† &}quot;The Network of World Trade," p. 9.

possible a rising standard of living, and also as lessening the likelihood of international friction.

It is obvious that even if arrangements can now be made which allow of a multilateral system of some kind functioning once more, it will be different in many respects from the one which was already in dissolution in 1938. True. the population masses are more or less where they were, the resources of material and energy are much the same, and located where they were, and the atomic power revolution is still in the future. But the structure of international investment and indebtedness has been fundamentally changed. The United Kingdom is a net debtor on capital account, and running a heavy debit balance on income account in its relations with the four other significant areas concerned in world trade. India and Egypt are new creditors holding sterling balances in London for very large amounts, and other countries also have likewise become creditors.

Continental Europe for world trade purposes consisted mainly of the industrial countries of Central Europe and the North-West, and of these the key country was Germany, which is physically half ruined, and politically and socially disorganized. The position of the United States of America in world trade has thus become more dominating than ever, and the dollar the nearest approach to an international currency. It is not possible to restore the old system in detail and the dominance of the United Kingdom in it. But it is possible to construct a similar system which will work.

In any such system Great Britain would have to secure her imports of food and raw materials by her exports of goods and services, with little help from the revenue from past overseas investments. These had been sold to the extent of some £1.065 million by June 1944, and those that will remain will not be in general the most profitable or best secured. Our standard of living will therefore depend very directly upon the efficiency with which we apply our resources of energy and skill to the raw material we obtain from abroad. Now our main source of energy—almost our sole resource—is coal. And in the output of coal per man-hour shift in 1937, according to a table given in the Economic Journal for June-September, 1945, p. 207, by A. Beacham, the position is as follows:

Output per man shift in statute tons

Great Britain		(1927) 1.031	(1937) 1.168
Ruhr		(1927) 1.114	(1937) 1.600
Holland		(1927) 1.002	(1937) 1.746
Poland	• • •	(1927) 1.172	(1937) 1.795

In the Ruhr and Holland the natural conditions are not less difficult than those in Great Britain.

It is clear from the example of Holland that the problem of getting our fundamental resources of energy at lower real and money cost is not insoluble. But it will take time and a very large investment, possibly of the order of £250 million: and some brains and goodwill.

From the same number of the *Economic Journal* we may quote from L. Rosta's article the following table:

Comparison from Census of Production Data U.K. output per man-hour=100

	U.K.	U.S.A.
Spinning:		
Independent yarn mills	 100	112-20
Integrated Spinners	 100	175-85
All Spinners	 100	161-72
Weaving	 100	250-60
Cotton industry total	 100	200-10

Whatever allowances and explanations may be made, it is clear that something is wrong in this industry as in the coal industry, and here, too, in the long run, new plant and machinery as well as new methods will be required.

In some other industries the situation is far more favourable, but one is disconcerted to read in the same article that "the cotton industry as a whole seems to be no farther behind American standards of labour productivity than is British manufacturing in general."

When we take into account the loss of buildings, homes, churches, schools, shops, factories, and the obvious obsolescence of our railways owing to lack of maintenance during the war, it is clear that we shall need to maintain a very high rate of saving for many years if we are to equip ourselves with the means of making a reasonably good national income and holding our own in the field of competitive exports. Austerity is just round the corner!

If this appears just one more economist's "glimpse of the obvious," it is none the less necessary to remind ourselves that in our condition hard work, effective organization, and for a time at least a high rate of saving, are essential to reconstruction and development. Also that very extensive reconstruction and development are needed if we are to live as well in the future as we have done in the past. And this is quite irrespective of any measures we may take to redistribute our national income on some preferred pattern, or any scheme of social security which may be developed to protect the individual against sudden misfortune.

It is also quite irrespective of which political party is in power at the time, or whether its leader comes from Harrow or Haileybury.

But even if our economic and social organization and our standard of efficiency were all that could be expected and desired, our main problems would still remain, as they remained outside our country for Germany after she had rationalized and reorganized her industry to enable her to meet her reparation payments between the wars.

Our problem is much the same. We have accumulated, as the result of this war, external obligations which could be met, if at all, without a further distortion of the structure of international trade in ways that are not likely to be acceptable to our creditors. We must prepare to become exporters on a hugely increased scale. At least 50 per cent. above our pre-war figure—perhaps 100 per cent.

But before we can get our exports up to anything like that figure, we have to make up for our present excess of imports due to the extreme over-mobilization of this country in the war. We sacrificed our export industries to squeeze the last man and machine into the forces and the munition industries. That was the agreed economic strategy and tactics. The Americans sent us the imports under lendlease so that it might not be essential to keep up exports to pay for them. Instead we exported fire and sword to the enemy. Now those exports of fire and sword are not needed; and the imports have to be paid for with peacetime goods—which we cannot make until we get our economy reconverted. Meantime we must have some of these imports—and that change-over must be financed somehow. Our American friends are quite ready to lend, but we are afraid to borrow. There may be no alternative except to beg, for however much we may restrict imports which have to be paid for in dollars, we shall need some dollar imports while our economy is scrambling back into a less warlike and more normal posture, and getting the exports made and on the market. This problem cannot be solved by saving at home, except in so far as saving will speed reconstruction. We need foreign credits, especially dollar credits, and we are afraid to borrow because we owe so much already that we do not see how we could repay.

Of course, the U.S.A. is not the only source of supply. We could buy in countries which are accustomed to take payment in sterling. But what good would more sterling be to countries like India, Egypt, Canada and others who already have great quantities of sterling in London with which they can neither buy British exports they need, nor American dollars to buy American exports. We already have such lia-

bilities in excess of £3,500 million. The amount of the outstanding inter-Government loans on which we defaulted in July, 1931, was £3,333 million. The problem of transfer is worse for us to-day than it was in 1931, and the magnitudes involved about the same. If our sterling liabilities were funded and repaid without interest over two generations, 60 years, we should have to make £97 million worth of exports every year and send them out without getting any imports in return. That is the second part of our problem.

The first is how to finance our recovery to a position in which our exports of goods and services will pay for our imports of goods and services, a happy state of affairs which has only come about in two of the fifteen years since 1931. In short, not since the system of multilateral trade and payment broke down.

The third part is the settlement for lend-lease. How much do we owe under that head? There is a useful table in the *Economist* for 8th September last (page 355), giving the following totals:

Country
Lend Lease
\$ million

United Kingdom ... 13,498.7

Reverse
Lend Lease
\$ million

3.796.9

The difference is the equivalent of about £2,400 million. In what sense do we "owe" this. Nobody pretends that this is a strict accounting, or that all that £2,400 million must be paid, or that it represents much more than that we have received far more material than we have given. But the President (and also in practice the Congress) of the United States must be satisfied with the benefit to the United States, which "may be payment or repayment in kind or property, or any other direct or indirect benefit which the President deems satisfactory," in the words of the Act of Congress.

What is the conclusion of the whole matter? We have to satisfy the President of the United States and enable him to satisfy the people of his country that our services in the common cause have been sufficient benefit to the United States to justify him in cancelling the whole of this obligation. That may be easy for the President, but will not be easy for his public, which has an almost morbid dread of being "played for a sucker" by the astute and perfidious British. We can easily overplay our hand by trying to prove that, so far from our owing the Americans money—they owe us! The right attitude would be expressed like this:

"We gave everything we had to the common effort. You made it possible for us to do so. Together with our allies we have secured this great victory. Let us call it all square. But if there is anything we can do for you, bases somewhere perhaps, some tangible recognition of our comradeship in the great adventure, won't you let us know?"

As for the £3,500 million of sterling liabilities, they cannot be paid unless there is a dramatic change in the economic position of this country, a change not impossible if we have a prolonged peace and an expanding world economy as we very well may. I do not see how we can undertake anything definite in regard to these balances until at least five years from now, when we may perhaps see a little more clearly where we are going. They are subsidies disguised in a commercial form, and if they cannot be cancelled will have to be scaled down. Again, we must do anything in our

power to meet the wishes of our creditors in other respects, but what cannot be paid will not—and the fact had better be recognized frankly, however humiliating it may be for the debtor and exasperating for the creditor.

As for the funds necessary to enable us to get back to a position of balance, which we have only attained twice in the past sixteen years, they can safely be borrowed if we really set about improving our equipment and efficiency, and play our part wholeheartedly in restoring the system of international exchanges under which we prospered so long. If we do not they will not be much use even as a gift.

Admittedly that means putting confidence in the capacity for financial leadership of the United States. But if you can't trust your creditor, whom can you trust?

A. N. O.

Efficiencies of Rockets

By E. Burgess

Fellow, Combined British Astronautical Societies; Member, American Rocket Society,

FOR many years there have been appearing articles in which various equations for rocket efficiencies were developed or quoted. Upon perusing these articles, it became apparent to the reader that at least three different schools of thought exist on the matter. The aim of this paper is to clarify the position, and to explain how the differences in theory have arisen.

It is important that the rocket should be regarded in its true perspective, that of a heat engine, and then, in a manner similar to that applied to other heat engines, it becomes possible to divide the efficiency into two main sections. Before considering these sections in detail, it is necessary to recall the exact meaning of the term "efficiency" as it is here applied. Usually, in the case of normal heat engines, a portion of the heat supplied is converted into mechanical energy, whilst the remainder is rejected into a sink via the exhaust. The mechanical energy is then partly changed to energy of motion or is expended in the doing of work. The efficiency may thus be described as the ratio between the work done by the engine and the heat energy supplied.

In the case of the rocket, the work done is the moving of the mass of the rocket through space, and the input energy is the result of exothermic chemical reactions. The heat energy first appears in the heated, pressurized products of combustion which are developed from the fuels in the blast chamber. These combustion products are normally in a gaseous state, and after generation they are expanded to ambient pressure through a suitably designed convergent-divergent expansion nozzle. During this expansion process a part of the heat energy is converted into kinetic energy in the exhaust stream. The resulting ejection of matter at a high velocity means that the force necessary to produce the acceleration must be opposed by an equal force on the rocket itself. The latter is commonly known as the thrust or jet reaction and is the force which drives the rocket forward.

The thermal efficiency of a rocket motor is regarded as the ratio of kinetic energy in the jet stream to the mechanical equivalent of the chemical energy in the fuel. The propulsive efficiency is the ratio between the work done in moving the rocket and the kinetic energy in the jet. The product of these two efficiencies is, of course, the aggregate or overall efficiency of the rocket.

In this paper the thermal efficiency will receive first treatment in view of the fact that the laws pertaining thereto are not in dispute. The conversion of the chemical energy of the fuel into efflux kinetic energy takes place through a number of separate stages. These may be listed as—

For liquid-fuel rockets.

(a) Injection of the fuel into the blast chamber,



with a slight expansion from fuel-feed to combustion chamber pressure.

b) Absorption of heat by the fuel, sufficiently to vaporize it and/or bring it to the temperature of combustion.

For solid-fuel rockets.

- (a) If the fuel is not already in the combustion chamber, it must be injected by a cartridge feed arrangement. No change of state occurs during injection.
- (b) Heating of the fuel to combustion temperature by means of a primer charge, fuse, or electrically heated wire.

And for both types of rockets.

- (c) Exothermic chemical reaction takes place, in which the formation of new molecules is attended by the release of great quantities of heat.
- (d) The products of combustion are formed at a high temperature, and are expanded and cooled by exhausting through the expansion nozzle.
- (e) The efflux gases are accelerated to a velocity which is proportional to the adiabatic heat drop along the nozzle.

In fact, the thermal efficiency can be conveniently subdivided into three sub-sections—

- (i) The combustion chamber efficiency;
- (ii) The ideal isentropic efficiency;
- (iii) The nozzle efficiency.

The first of these, the combustion chamber efficiency (η_c) makes allowance for such losses as those due to thermic dissociation, variation of specific heats and heat yield with temperature, radiation, and conduction of heat through the chamber walls. Thermic dissociation is reduced by increasing the chamber pressure and by using a surplus of one of the fuels over the stoichiometric amount. At the high temperatures of combustion it is found that the amount of heat, disengaged by the chemical reaction, is less than that released at lower temperatures. This is shown by the expression—

$$H_{To} = H_o + \int_0^{T_o} (s - S) dT \qquad (1)$$

where H_{To} is the amount of heat released at the combustion chamber temperature (T_o) , S and s are the specific heats of the products of combustion and the fuels respectively, at this temperature. An idea of the heat lost by conduction can also be gained from the common expression:

$$H_L = \frac{k \cdot Ac}{t} (T_o - T_2) \qquad (2)$$

where k is the conductivity, Ac the area, and t

the thickness, of the chamber walls, and T_2 the temperature of the outer surface.

It can thus be seen that the chamber efficiency is extremely difficult to determine in the general case, for it varies considerably with different shapes, designs, and materials, of motors, and also with the various types of fuel which may be employed.

However, the ideal isentropic efficiency does not present any great difficulties of solution for the general case. The adiabatic expansion laws enable an expression to be evaluated for this Theoretically, the expansion from chamber pressure to ambient pressure should be isentropic. In practice this is not so, and the expansion is normally described as being adiabatic but resisted. It is the friction between the gas stream and the nozzle walls which produces the irreversible eddies that increase the entropy as the gas passes along the nozzle. If the expansion is regarded as being ideal and reversible, the isentropic efficiency can be described as that of the well-known Carnot cycle, so that

$$\eta_i = \frac{T_o - T}{T_o} \tag{3}$$

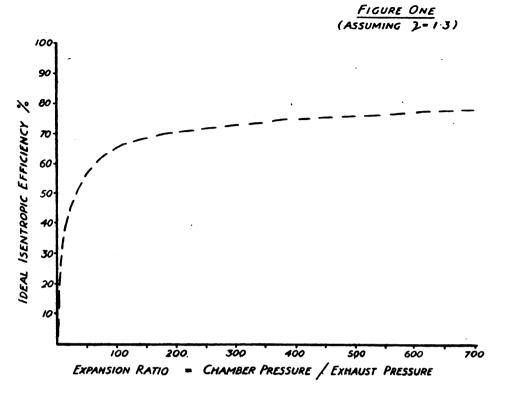
where T is the theoretical exhaust temperature. By substituting the pressure ratio for the temperature drop it is possible to express the ideal efficiency as a function of the expansion ratio. This is shown in Fig. 1, and it can be seen that modern rockets must have ideal efficiencies of less than 80 per cent. if operating within the lower atmosphere. Higher efficiencies may be obtained if the rocket operates in the upper atmosphere or in the vacuum of space.

It has been stated that eddies in the gas stream cause an increase in entropy which makes the expansion irreversible. This reduces the efficiency and can be allowed for by using an additional expression for nozzle efficiency. In high speed gas flow this is given by the equation

$$\eta_n = \frac{T_0 - T_1}{T_0 - T} \tag{4}$$

where T_1 is the actual discharge temperature, as opposed to that theoretically calculated from the expansion rate of the nozzle (T). For a first approximation, the nozzle loss can be regarded as a simple friction loss in a cylindrical pipe, by integrating over the velocity gradient involved. A decrease in nozzle efficiency will thus occur if the nozzle is unduly lengthened, and if the inner surface is not smooth and polished. The effect of the friction is to increase the entropy and reduce the amount of the available heat drop across the nozzle.

It is usual, when calculating the propulsive



efficiency, to take all \tilde{q} these thermal losses together, and to place η_i as representing the thermal efficiency of the motor, so that

$$\eta_I = \frac{v^2}{2 \cdot J \cdot H} \tag{5}$$

where v is the efflux velocity, H is the theoretical heat yield per unit mass of fuel, and J is the mechanical equivalent of the calorie. If it is remembered that the thrust given by a rocket motor is equal to the product of jet flow by jet velocity, it becomes possible to use empirical results, obtained from a proving stand test, in order to ascertain the thermal efficiency of any motor.

After having achieved a conversion of heat energy into kinetic energy in the jet, the purpose of the rocket must then be to cause the expending of this energy to result in a moving of the rocket itself. This is, however, where the differences in opinion arise, and diverse expressions for propulsive efficiency are developed. In the opinion of the writer, only two of these methods warrant consideration, and these will be considered in some detail. Henceforth in this paper they will be referred to as methods one and two.

METHOD ONE. In this approach to the matter the final effect of the combustion of the fuel is

assumed to be the work done in moving the rocket through space; that is, the product of the force applied and its displacement. The aggregate efficiency is thus:

$$\eta_a = \frac{\frac{\delta}{\delta t} \text{ (work done in fixed reference system)}}{\frac{\delta}{\delta t} \text{ (energy in fuel used to do this work)}}$$
 (6)

The reactive force is the product of efflux mass by efflux velocity, so that, if the ejected mass is $\frac{\partial M}{\partial t}$, and the rocket velocity is V, then

$$\eta_a = \frac{v \cdot V \cdot \frac{\delta M}{\delta t}}{\frac{v^2}{2\eta_t} \cdot \frac{\delta M}{\delta t}}$$
(7)

$$=2.\eta_{l}.\frac{V}{v} \tag{8}$$

utting

$$R = V/v \tag{9}$$

Then

$$\eta_a = 2 \cdot \eta_t \cdot R \tag{10}$$

Apparently, therefore, the aggregate efficiency increases indefinitely with increase in rocket

velocity, so that when R is greater than .5, more work is accomplished than the energy in the fuel can supply. Later it will be shown how this anomaly arises.

The propulsive efficiency in this method is obtained as:

$$\eta_{P} = \frac{\frac{\delta}{\delta t} \text{ (work done in fixed reference system)}}{\frac{\delta}{\delta t} \text{ (energy loss by rocket)}}$$
(11)

The energy lost by the rocket is assumed to be not only the chemical energy of the fuel, but also the kinetic energy of the mass of the fuel due to its motion with the rocket before ejection. Thus it is seen that

$$\eta_{P} = \frac{v \cdot V \cdot \frac{\delta M}{\delta t}}{\frac{v^{2}}{2 \cdot \eta_{t}} \cdot \frac{\delta M}{\delta t} + \frac{V^{2}}{2} \cdot \frac{\delta M}{\delta t}} \\
= \frac{2 \cdot \eta t \cdot R}{1 + \eta_{t} \cdot R^{2}} \tag{13}$$

Differentiating in order to find optimum conditions,

$$\frac{d\eta_{P}}{dR} = \frac{2 \cdot \eta_{t} (1 + \eta_{t} \cdot R^{2}) - 2 \cdot \eta_{t} \cdot R^{2} \cdot 2 \cdot \eta_{t}}{(1 + \eta_{t} \cdot R^{2})^{2}}$$
(14)

That is, for maximum propulsive efficiency,

$$R = \eta t^{-\frac{1}{4}} \tag{15}$$

and substitution for R in (13) gives the maximum efficiency as:

$$Maximum \eta_p = \eta_t^{\frac{1}{2}}$$
 (16)

These represent values of instantaneous efficiencies at various rocket velocities, and it is now necessary to calculate the average efficiency over the whole flight from R=0 to R=R. This will be:

average
$$\eta_{P} = \frac{1}{R} \int_{0}^{R} \frac{2 \cdot \eta_{t} \cdot R}{1 + \eta_{t} \cdot R^{2}} dR$$
 (17)

$$= \frac{1}{R} \cdot \log_{e} (1 + \eta_{t} \cdot R^{2})$$
 (18)

In order to ascertain the maximum value of this average efficiency, it is necessary to differentiate with respect to R and equate to zero, namely:

$$\frac{d}{dR} \text{ (average } \eta_p) = \frac{2 \cdot \eta_t}{1 + \eta_t \cdot R^2} - \frac{\log_e (1 + \eta_t \cdot R^2)}{R^2} = 0 \quad (19)$$

FIGURE TWO

(METHODI, ASSUMING 7,-1) R=1; 70 = 100% $\eta_p = \frac{2\eta_c R}{I + \eta_c R^2}$ R= 1 98; aver 7, = 80 5% 80 aver. 7 = + loge(I+7,R2) 70 60 EFFICIENCY % 50 40 30 20 10 3 5 6 2 VELOCITY OF ROCKET / JET VELOCITY

And,

$$\log_{\ell} (1 + \eta_{\ell} \cdot R^{2}) = 2 - \frac{2}{(1 + \eta_{\ell} \cdot R^{2})} \quad (20)$$

By equating $(1+\eta_t \cdot R^2)$ to u,

$$\log_e u + \frac{2}{u} = 2 \tag{21}$$

The following table is compiled, and from this it can be seen that u is approximately equal to 4.923 if equation (21) is to be satisfied.

The rate of consumption of fuel is $\partial M/\partial t$, so that

$$\frac{\partial}{\partial t}$$
 (kinetic energy of rocket) = $M \cdot V \cdot \frac{\partial V}{\partial t}$ + $\frac{V^2}{2} \cdot \frac{\partial M}{\partial t}$ (28)

The fundamental equation of rocket motion is:

$$\delta V = v \cdot M^{-1} \cdot \delta M \tag{29}$$

u	3.0	4.0	5.0	4.9	4.92	4.922	4.923	4.924	4.925
loge u	1.098	1.386	1.609	1.5892	1.5933	1.5937	1.5939	1.5941	1.5943
u/2	.667	.500	.400	.4082	.4064	.4062	.4061	.4061	.4061
$og_e u + \frac{u}{2}$	1.765	1.886	2.009	1.9974	1.9997	1.9999	2.0000	2.0002	2.0004

Therefore

$$R^2 = 3.923/\eta_t \tag{22}$$

and

$$R = 1.98/\sqrt{\eta_t} \text{ (approx.)} \qquad (23)$$

By substitution it can be seen that the maximum average propulsive efficiency is $.805\sqrt{\eta_i}$.

These values of propulsive and average pro-

These values of propulsive and average propulsive efficiencies are plotted against R on Fig. 2.

In order that the product of thermal and propulsive efficiencies should equal the aggregate efficiency, a fourth efficiency is needed with this method. This is called the kinetic efficiency, and it is the ratio of energy lost to energy in the jet, so that

$$\eta_l \times \eta_p \times \eta_k = \eta_a \tag{24}$$

The expression for kinetic efficiency is

$$\eta_k = \frac{\text{Energy lost by rocket}}{\text{Energy in jet}} (25)$$

$$= \frac{1 + \eta_t \cdot R^2}{n_t} (26)$$

and it can be seen that its value increases indefinitely with increase of rocket velocity.

METHOD Two. In this method the work done is regarded as being the product of force by displacement *less* the kinetic energy lost by the rocket with the ejection of a portion of its mass (fuel). More correctly, it can be expressed as the change in the kinetic energy of the rocket per increment of ejected fuel. The aggregate efficiency is thus given by the expression:

$$\eta_a = \frac{\frac{\delta}{\delta t} \text{ (kinetic energy of rocket)}}{\frac{\delta}{\delta t} \text{ (energy of fuel used)}}$$
 (27)

giving the thrust as

$$F = \frac{M \cdot \delta V}{\delta t} = -v \cdot \frac{\delta M}{\delta t}$$
 (30)

Therefore by substitution,

$$\eta_{a} = \frac{-\nu \cdot V \cdot \frac{\delta M}{\delta t} + \frac{V^{2}}{2} \cdot \frac{\delta M}{\delta t}}{-\frac{v^{2}}{2 \cdot n_{t}} \cdot \frac{\delta M}{\delta t}}$$
(31)

$$= \eta_t \cdot R (2-R) \tag{32}$$

To find maximum values,

$$\frac{d\eta_a}{dR} = 2 \cdot \eta_t (1-R) = 0 \tag{33}$$

and
$$R = 1$$
 (34)

For average aggregate efficiency:

average
$$\eta_a = \frac{\eta_t}{R} \int_0^R (2R - R^2) dR$$
 (35)

$$= \eta_{l} \cdot R(1 - \frac{R}{3}) \tag{36}$$

and for maximum average aggregate efficiency:

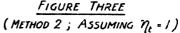
$$\frac{d}{dR}(\text{average }\eta_a) = \eta_i \left(1 - \frac{2}{3}R\right) = 0 \tag{37}$$

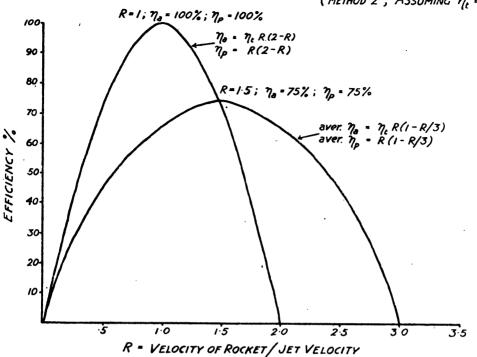
That is,
$$R = 1.5$$
 (38)

By substitution in (36) the maximum average efficiency is found to be $.75\eta_t$.

The propulsive efficiency is given by,

(27)
$$\eta_P = \frac{\frac{\delta}{\delta t} (\text{kinetic energy of rocket})}{\frac{\delta}{\delta t} (\text{kinetic energy of jet})} = \frac{\frac{\delta E}{\delta t}}{\frac{\delta e}{\delta t}}$$
 (39)





Hence,

$$\eta_{P} = \frac{-\nu \cdot V \cdot \frac{\delta M}{\delta t} + \frac{V^{2}}{2} \cdot \frac{\delta M}{\delta t}}{-\frac{\nu^{2}}{2} \cdot \frac{\delta M}{\delta t}}$$
(40)

$$= R(2-R) \tag{41}$$

Maximum value is again when R=1, and the average propulsive efficiency is given by

average
$$\eta_p = R - \frac{R^2}{3}$$
 (42)

so that maximum average propulsive efficiency is also when R is 1.5 and is, of course, equal to .75. The values of efficiencies calculated by this method are plotted against R in Fig. 3.

Comparing the two methods, it can be seen that in Method One, as soon as R exceeds .5, the aggregate efficiency becomes greater than 100 per cent., which makes it necessary to reject this method. The anomaly arises due to the fact that the loss in kinetic energy is not allowed for when calculating the work done. In the case of the propulsive efficiency there is also a debatable circumstance. The development of the equation assumes that the kinetic energy of the fuel, due to its motion with the rocket, is available for

propulsion. This is not so, and the energy must be regarded solely as a loss.

Although in Method Two negative values of efficiency are obtained when R exceeds two, and at first glance this may cause the reader to reject this method also, a little further consideration will lead to the formation of a different opinion. For values of R which are greater than two, it is found that the rocket is losing kinetic energy more quickly than acceleration from the burning of the fuel can replace it. The efficiency thus becomes negative.

Method Two is the correct one, and using the equations of this method, it is interesting to calculate the mass ratio required for optimum aggregate efficiency. The academic case of a rocket isolated in space outside the influence of gravitational fields will be considered first. The equation of motion in this case is:

$$dV = v \cdot M^{-1} \cdot dM \tag{43}$$

giving, upon integration,

$$V = v \cdot \log_e M_r \tag{44}$$

where M_r is the mass ratio. Hence

$$M_r = e^{\frac{V}{v}} = e^{R} \tag{45}$$

Therefore the optimum mass ratio is 4.48, and this is independent of the thermal efficiency. This mass ratio also produces maximum average propulsive efficiency, and implies that, of the original weight of the rocket, approximately 77 per cent. must consist of fuel.

In the case of a sounding rocket launched vertically upwards in a gravitational field, but neglecting the effects of atmospheric drag, a first approximation gives:

$$M_{r} = e \qquad \frac{V+t \cdot g_{m}}{v} \qquad \frac{R+t \cdot g_{m}}{v}$$

$$= e \qquad \frac{t \cdot g_{m}}{v}$$

$$= 4.48 e \qquad (46)$$

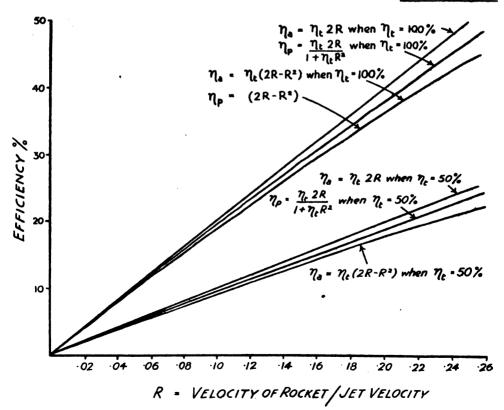
Thus it can be seen that the optimum mass ratio for maximum efficiency is now dependent upon the jet velocity and the time of burning. In order for the mass ratio to be as close as possible to the minimum value for optimum conditions, it is necessary to either reduce the time of burning to as short a time as possible,

or to increase the jet velocity. This latter is usually a constant, so that the burning period is the only possible variable and it assumes great importance in the design of rockets. The effects of atmospheric drag will further complicate the matter and reduce the efficiency.

A rocket-propelled aircraft functioning in the denser layers of the atmosphere presents a different proposition. In this case equation (44) does not represent the motion because the aircraft travels for most of its flight at a constant velocity when the thrust of the motor is balanced by the drag of the aircraft. The efficiency will hence remain at some almost constant value during the whole of the flight, except, of course, at the start and finish. It is quite apparent, too, that rocket-propelled aircraft must necessarily operate at low values of R and the efficiency will suffer accordingly.

In the case of rocket-propelled vehicles which are designed to travel at velocities equal to or exceeding that of their efflux, Method Two must be employed. It is nevertheless immaterial which method is applied for calculations regarding rocket efficiencies where the forward speed will

FIGURE FOUR



only be a small fraction of the exhaust velocity. There is, however, one provisor, and this is that if the thermal efficiency is less than 100 per cent., as must be so in practice, the propulsive efficiency of Method One must be multiplied by the kinetic efficiency of that method if it is to be compared with the propulsive efficiency of Method Two. Fig. 4 shows the closeness of the four curves for values of R between zero and one-quarter. An R of one-quarter, in the case of liquid oxygen and ethyl alcohol, working at about 50 per cent. thermal efficiency, means a forward speed of nearly 1,500 miles per hour. It is highly improbable that aircraft, as such, will exceed this velocity.

In order to apply the tremendous potentialities of the jet-reaction motor to terrestrial transport, some means of increasing the propulsive efficiency at low speeds has to be employed. The one way in which this can be done is by reducing the jet velocity. Unfortunately, such a reduction means a decrease in the thermal efficiency of the motor, except in that case where some of the heat energy of the fuel is employed to accelerate a mass other than that of the fuel itself. This can be relatively easily brought about by allowing the fuel to heat, and hence accelerate, quantities of atmospheric air which surrounds the

rocket. By an arrangement of ducts, the total energy of the fuel can be employed to accelerate a mass, composed of fuel and air, to a velocity which is less than that resulting from the acceleration of the fuel alone. With such an arrangement, it is found that not only is the propulsive efficiency improved, but also the available thrust may be considerably increased.

For good operation at very low velocities, it is necessary to have a large mass of air injected by means of a compressor. Energy needed to drive the compressor may be obtained from the fuel, thereby further reducing the efflux velocity. The energy is normally applied to the compressor via a turbine inserted in and actuated by the stream of effluents.

In conclusion it is apparent that jet-propulsion with turbo-compressors is necessary in order to give good results at low velocities, but that as the velocities increase, less air is required, the air injector becomes unnecessary, and ultimately pure rocket propulsion should be employed. Jet propulsion is therefore of great assistance to aircraft or rocket projectiles operating at speeds well below that of the theoretical efflux velocity of the fuel employed, and pure rocket propulsion must be utilized for optimum results as greater and greater velocities are required.

Memoirs of an Early Instructor

By LIEUT.-COMMANDER (A) F. WARREN MERRIAM, A.F.C., F.R.AE.S. (late R.A.F. & R.N.V.R.)

(Continued from page 213, Vol. 16, No. 4)

IV.—I BEGIN INSTRUCTING

DISCLOSED the secret of my new role of aviator to my parents. They were greatly opposed to it, but became reconciled as time went on. I had taken my "ticket" under my rightful name and was known onward as Warren Merriam.

Capt. Charles Longcroft, as already mentioned, belonged to the little cluster of pupils learning to fly at this time, and he was one of the first I was privileged to give official instruction to as soon as I had become a certified pilot.

Capt. Longcroft would have taken his ticket sooner had it not been for the misfortune of an early crash when he completely wrecked one of the school machines. I believe this happened on the occasion of his first solo. It was lucky that his injuries were no more than a bad black eye and bruises. It did, however, leave us only one machine with which to carry on, and Pizey would not risk any damage being done to it.

It was over this crash, though, that Pizey really gave vent to his feelings. I was in the sheds tinkering when he came in to display his wrath and it was the only time I ever saw him roused. The fact that school work was to be hindered until such time as another machine was forthcoming was very provoking.

But school work continued, very slowly, and all the pupils' nerves were at high tension with anxiety at the possibility of crashing the only remaining machine. Such remarks as "Take care, don't bust the only one!" were shouted at each pupil as he took off, but this only intensified feelings.

A change of instructors took place about this time, when Mr. E. Hotchkiss, from our Salisbury School, became the manager and chief instructor in Pizey's stead and I was appointed assistant instructor to him. Everybody was sorry when Pizey left. He was loved by all. I bade him farewell and felt that I should never

have another of his kind to work with, but luckily Hotchkiss had almost that same charming disposition and we pulled together well.

I had one very exciting time with him as his passenger on a Bristol monoplane; in fact, this was the first occasion on which I experienced "cold feet!" He was not at home with this particular machine, as it was a new type to him. I would have given anything to have been excused, but rather than have any little hitch in our friendly associations, I agreed quite cheerfully to fly with him and he had not the slightest suspicion of my nervousness.

As I anticipated, it was a most nerve-racking experience; we had hairbreadth escapes, skimming the tree-tops, almost colliding with a train running along the top of the track, and finally landing with a bump on the brink of the sewage farm. We were lucky to get down safely.

I had assisted with the tuition of three officers who took their tickets on 6th July, 1912, all in one day. They were Lieuts. A. Christie, H. I. Bulkeley and E. V. Anderson. The lastnamed, with his mechanic, was killed in a midair collision with another R.F.C. machine piloted by Lieut. C. W. Wilson, on 12th May, 1914, at Farnborough. This was the first R.F.C. accident of its kind. Wilson was descending, whilst Anderson was climbing. Both machines involved were Sopwith tractor biplanes (80 h.p. Gnôme). Anderson and his mechanic were killed instantly, but Wilson escaped with injuries.

School work was very slow. Instruction was too vague and inadequate to be termed "instruction," and only the most air-minded pupils were likely to get their brevets under weeks of futile practice with this so-called tuition.

I was now in a position with the school to bring into practice any scheme which would improve matters, so after carefully considering the risk, for risk it was, I set to work experimenting on a new method of teaching, which eventually superseded the old, and led to much saving of time, money and crashes for the pupils, many of whom were Army and Naval officers learning to fly from their own private resources, and taking advantage of leave to work in their tuition. They benefited greatly because they were now able to learn as much in days as they had hitherto learned in weeks or even months.

My new plan was to sit behind the pupil, giving him full charge of the rudder, but only part control over the joy-stick, until he had acquired the "feel." There was great danger attached to this, and I had to be constantly on the alert, so it was all a great strain. However,

living and associating myself very closely with the pupils outside flying hours helped me in finding out their temperaments and characteristics, and thus I knew what to expect of them in the air. This was a most important job for the instructor. Each pupil would require individual understanding. Some were very heavy on the controls, others erratic and impulsive. However, I usually knew my man and what to expect, more or less. Sitting up there in the open, with no instruments, no straps, no protection and with only a 50 h.p. engine that might peter out at any moment, I was almost entirely at the mercy of my pupil. There was no dual control. If my pupil got frightened and refused to do what I told him, I was practically helpless as the only control I could reach from my position behind was the joystick, by leaning over the pupil's shoulder.

After the pupils had been given their first passenger flight, I lectured them on the signs I used in flight for reaction on the rudder. It was simply this: a squeeze on the right shoulder of my pupil indicated that he must push the rudder with his foot to the right; a squeeze on the left, likewise to the left; equal pressure on both shoulders, straight ahead. When the pupil was advanced sufficiently to be entrusted with the joystick, similar signs had to be adopted. When I pushed his body a little forward, or pulled him backwards, he responded to this by making appropriate movement of the stick. The whole thing was akin to horse sense—in fact. it often occurred to me that the use of bits and reins would be quite a sound idea, though somewhat uncomfortable, especially to the less responsive ones! I feel sure, however, that so keen were they all to master the early principles of flying, that they would have put up even with this!

So far so good. Pupils were doing so wonderfully well after short periods of this automatic sort of tuition that soon they were able to take me for reassuring circuits, and I knew quite well what to expect of their first solo. There was, indeed, no need for me to hide in the "Blue Bird" whilst this was in progress, although I must admit I was always relieved when this stage was passed.

I must mention one well-known personality. Major John Higgins, who was so well tuned up after a short term of this tuition that I was able to warm my hands in my pockets whilst he took complete control. He will doubtless remember it too!

Great confidence was essential for flying in those days. I hope my presumptuousness will be forgiven when I say that I had this, and was luckily endowed with the valuable gift of enabling me to instil it into my pupils, without which I could never have started this method of instruction which was to prove so valuable. Confidence is still the high essential for flying, together with perfect health, but the present-day pilot has something more—he has knowledge. But he has not the same fascination as we had of probing in the dark, with every new experience teaching us something, though often, alas, at a heavy price in casualties.

Salaries at that time were none too startling. I am not in a position to speak of any other pilot-instructor as there were so few in those days, but I am able to judge that my own case was no exception to the general run of pay. My highest salary was £300 per annum. I received commission for prizes won in competitions, and a small percentage on the pupils I introduced to the School. The fascination for flying, however, was apt to divert one's attention from the remunerative side. My salary was out of all proportion to the work and the risk I was running, but no aviator cared a rap about the £ s. d. side so long as he could fly.

I had the opportunity soon after the war to earn more than £1 per minute in the air for testing and experimenting with new types of aircraft. I did actually earn £50 for less than fifty minutes' flying, but alas, owing to prolonged strain and previous injuries, I was unable to avail myself of such good prospects for a longer duration of testing. One's nerves and health had to be in perfect condition for this type of job, which was very different from flying ordinary standard aeroplanes.

The Daily Mail roused much public enthusiasm by commissioning several well-known pilots of that day to tour the country giving flying exhibitions. Gustav Hamel, W. H. Ewen and B. C. Hucks were three who took part. The latter cheated aviation and died from natural causes. He was one of the best pre-war flyers and caused a great sensation wherever he flew, and was, as I have mentioned before, the first Englishman to loop-the-loop.

At about the end of July, 1912, all the Salisbury pupils and school machines were transferred to our Brooklands branch to make way for military trials which were gathering to compete here. The Salisbury instructors remained behind to take charge of the company's competition machines.

This turnover imposed a tremendous amount of extra work. Hotchkiss and I were continually on the go. Flying commenced at 4 a.m., weather permitting, and I used to rise at 3.30 a.m. and dash round to the pupils' quarters to

wake them. They did not need much rousing though! There were about twenty-four altogether at this time. Six passed for their brevets in one week, the weather being favourable throughout. They were Lieuts. F. M. Worthington-Wilmer and F. F. Waldron, Mr. Sydney Pickles, Major J. F. A. Higgins, Capt. C. P. Nicolas and Lieut. K. P. Atkinson. A few days later Capt. A. L. MacDonnell and Mr. R. G. Holyoake passed also. All this work was accomplished with only one smash, which merely laid up the machine for a couple of days. It was afterwards acknowledged that we created a record which eclipsed everything done previously in school work in England. This was most gratifying to me in consequence of my new teaching method, without which, I might say, it could not have been achieved. We had worked so hard during this time that we remained in bed for a whole day during the week-end endeavouring to recover our lost sleep!

Apart from nicer atmospheric conditions in the early hours of the morning, pupils seemed in a better mood for tuition. In the middle of the day during the summer months the heat made flying dangerous on account of bumps, or winds would spring up. Wind then was our chief obstacle. Hour after hour eyes would be glued on the aerodrome flag. Often it would flutter and stop. Out would come the machines with a rush, and the pupils would climb into them. Then the flutter would start again and out would climb the pupils! The wind literally fooled us and seemed to laugh at us.

Prince Cantacuzene of Rumania was about the first member of any royal family to learn to fly. He came to us from Salisbury, where he had been learning to fly on the biplanes under Harry Busteed, to have advanced tuition with us on the monoplanes. He was very keen on flying.

Hotchkiss was given a commission in the Special Reserve, R.F.C., and was called away at intervals, which left me to carry on single-handed a good deal.

Some of Brooklands Aerodrome Official Reports round about this time make interesting reading on account of famous names, including those of Turkish and Bulgarian officers, which have gone down in early history of aviation. Some of them are unfortunately no longer with us. I feel prompted to take a few extracts from press cuttings in my album, referring to their tuition days:

"Major Brabazon, coming over sewage farm, had petrol pipe break, with result that he had to make hurried landing. Wheels stuck in ground, machine turned on to elevator, and threw unfortunate pilot out, but luckily with no

damage, except to dignity."

"Tuesday evening last week saw an abatement in weather and the Bristols came out in force. Mr. Merriam was on one biplane and Mr. Hotchkiss on another. Then both pilots started giving tuition flights to the officers Fazil, Abdullah, Aziz, Fethi, Mehmed Ali, and Sahni, Capts. Price and Styles, Lieuts. Glanville, Carmichael, Hope and Hanlon, and Messrs. Hall, Payze and Pretyman, and Lieut. Loutcliffe. Messrs. Hotchkiss and Merriam were kept more than busy as they managed to take up all these pupils a couple of times each, giving most of them a couple of circuits with a right-hand turn thrown in.

"In the meantime, on the two solo machines, Major Ashmore, Lieut. Joubert, Mr. Gould and Mr. Barnwell were each flying figures of 8. Messrs. Cheesman, Summerfield, Darracq, and Lieuts. Wanklyn and Playfair, all flying good circuits, while Capt. Boger was taxying."

"The monoplane section of the Bristol School were equally busy. Mr. Merriam was testing one Anzani-Bristol monoplane, Hotchkiss another. Prince Cantacuzene, Bettington and England afterwards, all flying well."

The 3rd of August, 1912, was a red-letter day for the school, inasmuch as seven of the pupils just referred to in the tuition stages got their tickets.

It seemed that nothing could have damped our jubilation, yet in the midst of our rejoicing came the shocking news of Mr. Lindsay Campbell's crash in a field near the aerodrome. He was flying a Bristol monoplane at the time and nose-dived after a stall.

Hotchkiss and I had given him joint tuition, and had expressed our opinion that he was very heavy-handed on the biplanes, and ought not to have been flying the monoplanes for some time. At the time of his accident, I was so frightfully busy that I had no idea that he was going to do a circuit. He should only have been doing "hops" and "straights." Lindsay Campbell was in his fiftieth year, which was not a suitable age to learn to fly in those days. Campbell had been sent to England by the Australian Government to learn to fly to befit him to hold a position as chief organizer of a flying service in that country. He had taken his ticket on Salisbury Plain on a Bristol biplane previously, and was taking advanced tuition.

Hotchkiss was afterwards called away again, this time on Army Manœuvres, and on 10th September, 1912, was himself killed with his passenger, Lieut. C. A. Bettington (a late pupil of our school), on a Bristol Monoplane. We were all deeply grieved at this double fatality.

Gradually one or another would be taken from our midst. We became hardened to the fact that in our line of business nothing was certain. "Here to-day, gone to-morrow" was the motto which we had to accept as the true reality of things. The sacrifice was a great one, but our fascination for the work still predominated.

I think it would be a pity not to record the following amusing story which I have extracted from my "Brooklands Flying Reports," written in August, 1912, by Hotchkiss, just before he was killed:

"Last Tuesday morning Mr. Percival, who was flying the Caudron biplane, was having difficulties with his machine through the Anzani engine not pulling properly. Suddenly everyone on the ground was horrified to see the machine sideslip in a ghastly manner to within a few feet of the ground, then pick up again and continue flying.

"Upon landing, Mr. Percival said he could not make the machine climb, and when she started side-slipping, he let go the controls and clung to the sides of the fuselage.

"The result was that the machine, knowing a good deal about flying, corrected itself and went on flying.

"This speaks very highly for the humanity of the machine that takes such great care of whoever it gives a flight to!"

Caudron biplanes were used at Hendon for school work before the war and I had never known any to break up in the air. I tried to teach pupils on them at the beginning of the war but I found that they were quite unsuitable for elementary tuition.

In September, 1912, I was appointed manager, chief pilot and instructor to fill the unfortunate gap caused by the death of Hotchkiss. Mr. W. Bendall came from Salisbury to assist me soon after. The school was full of activity.

When the weather was too bad for flying there was always plenty to be done in the sheds—repairs and lecturing, etc. My balancing and juggling talents came in very useful here and were favourite amusements with the pupils. It was beneficial also to their training as it encouraged a sense of "feel" when they practised themselves.

Landings, of course, just as in the present day, always required much practice to make them smooth and well-judged. The flying part is easy for anyone with a bit of courage, and many accidents have been, and always will be, due to a great extent to bad landings and bad

approaches.

One thing, however, in those days presented even a greater difficulty than that of effecting a happy landing. This was the dreaded righthand turn. Pupils really funked doing these. Left-hand turns were easy, but to make figuresof-eight where right-hand turns had to play a part, pupils found themselves up against it. It is easy to understand the reason for the difficulty. The Gnôme was a rotary engine, and owing to the gyroscopic action when it was in rotation, the nose of the machine had a powerful tendency to rise into a stalling position when making a right-hand turn. This was the peculiarity of the pusher type of those days. Given plenty of room, it was fairly easy; but in a limited radius it was not at all easy.

I had experienced just the same difficulty in my own training, but after careful study and practice, I decided that the difficulty was largely

psychological.

To make a right-hand turn the following actions had to be carried out simultaneously: Depress the joystick gradually to get the nose of the machine down; hold the stick to the right in order to tilt the left wing; and rudder with the left foot to effect a reasonably acute turn. The whole thing needed practice and confidence.

A great deal of my success as an instructor in those primitive days was attributable to the measures I employed, first demonstrating with ease all the difficulties present in the minds of new pupils and starting them off with the problems first, thus making right-hand turns before the left, and so on.

The rotary Gnôme engines had a rather nasty habit of suddenly catching fire. One had to remember to reduce the petrol consumption before switching off.

Major Sir A. Bannerman was piloting a school biplane with a rotary Gnôme engine one day and had just landed, when I noticed a fire from the distance and rushed over. To my dismay I discovered his engine was burning fiercely, so with all speed I tugged off my coat and flung it over the blaze, fortunately putting out the fire and thus averting the loss of the whole craft. It was a relief to know that I had managed to save our precious school machine, but my feelings were mixed when I saw all that remained of my jacket, which incidentally had been a new one!

I shall never forget my consternation on my first night flight on a similar machine, when on casually glancing behind me I saw what appeared to be a gigantic "catherine wheel."

My first thoughts were that the engine was on fire but I soon realized that this ring of flame was due to the exhaust from the valves of the rotating engine. Of course, these flames were always coming out of the valves when the engine was running, but in the day-time they were not visible.

On 17th September, 1912, six more fledglings were passed out, one after the other. They were Messrs. J. L. Hall, S. Summerfield and E. W. Cheeseman, Capt. C. L. Price and Lieuts. G. B. Stopford and A. C. H. MacLean.

Here is an example for the boys of to-day. The youngest certified pilot in England, who was only fifteen years old, used to come to me for tuition. He was then Midshipman N. F. Wheeler, R.N., a plucky and clever little fellow indeed. He finally went to our Salisbury School, I believe, for convenience, to take his ticket, which was No. 370.

Competitions and exhibitional flying made a pleasant break from the monotony of instructional work. Meetings were arranged by the Brooklands Automobile Racing Club under the auspices of Major Lindsay Lloyd, who worked so hard to draw public interest to flying. There were prizes to be contested for—bomb-dropping (with chalk bags), cross-country races, landings on a specified mark, and other novel features. I was lucky in winning a number of these. Mr. Frank Wright was the handicapper. Messrs. Sopwith, Hamel, Hawker, Alcock, Sippe, Pashley, Raynham, Knight and other well-known pilots took part at these meetings.

Just in the same way as to-day, crowds liked to see stunting, especially when they had travelled some distance for an afternoon's flying entertainment, and all the available pilots would oblige with their own particular "hair-raiser."

The box-kites were not made to stunt, but flying could be made very spectacular by corkscrew descents and other manœuvres. The low horse-power of these machines made it impossible to rise quickly and spectators would patiently wait for half-an-hour or so for us to gain sufficient height to perform such feats. In comparison, it would take only seconds to-day to do the same thing. One show I particularly liked doing was to make a steep corkscrew descent with the prop stopped and land on a specified mark on the aerodrome. This, of course, required a lot of practice and judgment. The public always seemed to think that a crash was inevitable once the engine was absolutely stopped, and many people to-day are under the same impression; but it is a manœuvre which the average pilot does not care about.

I remember reading as late as 1936 in a

Southampton paper the following paragraph referring to an air rally at Hamble, with the

startling headline:

"Daring Feat. — Flying Officer A. G. Abbott probably took the greatest risk of the afternoon by landing right in the centre of the aerodrome from a height of 1,500 feet with a stopped propeller."

So it appears that this stunt still held a thrill after about twenty-five years, when I remember an aviator was awarded £500 for

doing the same thing!

It was always disappointing to pupils when the weather was a wash-out for school work, and on one of these dismal grey mornings with the mist hanging very low, I was standing out on the aerodrome with the usual crowd of pupils waiting for the wash-out signal for flying. I was quietly deciding in my mind whether it would be foolhardy for me to attempt to investigate the conditions above the mist. My imagination gave me a fair insight to the beauty that lay beyond; but how far one had to climb to penetrate this mist and cloud I had no idea. We were not only, to a great extent, ignorant of the elements at that time, but were without the help of instruments to guide us on such exploits as these.

I had often longed to do this and had never heard of a pilot who had tried. I certainly believe that nobody ever had, up to that time, and although I realized that it would be dangerous, I determined to have a shot at it.

When at length I expressed my intentions, a chorus of voices rang out, "I'm with you, Merriam!" On this new adventure, however, I would not risk taking anyone with me until I knew more about these things. So I started off and met with no more difficulty than I had

anticipated.

Climbing steadily, absolutely blind as it were to all that was above or below me, enveloped entirely by a damp cold mist, my leather coat protecting my body, but with my trousers saturated, I had to depend solely on my balance and instinct to keep as near the aerodrome as possible. My work as an instructor had taken me up and down with pupils so many times that I could almost take off and come down blindfolded. Therefore, I had no undue anxiety with regard to my direction.

Cutting steadily through about 500 feet of this cold thick mist, it gradually became lighter, and at last I found myself emerging into brilliant sunshine with endless clear blue sky above. Below me, and as far as I could see, was an ocean of white cloud. It was like flying over the sea, completely out of sight of land. The gran-

deur of the spectacle was incredible. Never having beheld anything like it before, I felt that I wanted to fall into the soft feathery-like bed, being lulled almost to sleep in the warm sun above the clouds. I wanted to stay. It was all too marvellous to leave. Here was not the time to romance, however, and turning my thoughts abruptly to earthly matters I reluctantly pushed the nose of my machine down, as I had been away quite long enough to give rise to anxiety to all who were waiting below. By a combination of luck and good judgment I came through the mist well over the aerodrome.

It was difficult to convince those who were waiting down in the miserable cold conditions that I had been basking in heavenly sunshine above, and not until I had taken two pupils up in succession would they believe that it was no

fairy tale.

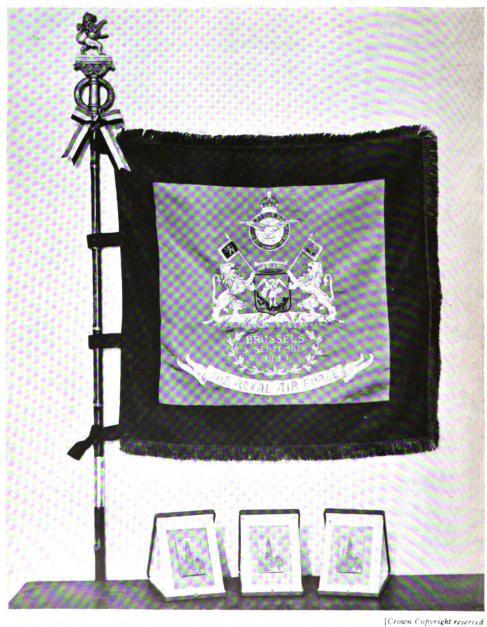
Fate had decided upon yet another experience for me—quite the reverse of the heavenly adventure I have just described, though. I was destined to come into intimate contact with the sewage farm, and to this I became attracted when I was testing one of our 25 h.p. Anzani Bristol single-seat monoplanes. It was no new experience for me to be on a monoplane, for I was accustomed to testing them often for some of the advanced pupils who had a course on them after they had qualified on the box-kites. On this occasion the wind was in the direction which necessitated my cutting across the corner of the sewage farm to get up sufficient altitude to do a circuit. I had not climbed 50 feet when my engine cut out and my machine was drawn by the seductive charms of the sewer! There was no alternative for me now but to glide into it. I damaged my head on the nacelle and was pinned in the machine as it nosed over and I had great difficulty in extricating myself. The slush oozing into the cockpit impeded the attempt to free myself, and prolonged the disagreeableness of the situation! I was anxious to get out and signal that I was O.K., as was the rule when there was a crash. I had to crawl under the side of the machine with my hand over my mouth and nose, burrowing my way like a rabbit through several feet of this unwholesome muck. But directly after a hot bath and a change of clothing, I was flying again.

This was the first mishap I had encountered since I took up flying, and it could not be called an accident. It was not due to carelessness but to low engine-power, and the only damage done was to the propeller.

I was once up with a pupil at about fifty feet when the propeller broke. This was caused by a mechanic leaving a split-pin on the plane



A. R.A.F. CZECHOSLOVAK SQUADRON BEING INSPECTED ON ARRIVING HOME, PRAGUE



PRESENTED TO THE R.A.F. BY THE BURGOMASTER OF BRUSSELS
An embroidered silk Standard and Bronze Plaques

which later became free and flew into the prop causing it to disintegrate. The scattering pieces then broke the elevator controls and tail-booms and jammed the front elevator. As luck would have it the latter was jammed at a convenient angle for coming down and we were fortunate in landing with slight damage only to the undercarriage and none to ourselves.

Propellers frequently broke because they were made from one solid piece, I believe to save expense. I eventually advised the firm to have them laminated for safety, which they did, and even these used to split sometimes, but on the whole were more reliable.

It was not always safe on the ground. One day an advanced pupil who had made a good landing after a solo flight was taxying towards the hangar, switching on and off to prevent the attaining of flying speed, when suddenly the switch would not turn off! The pupil, not having the presence of mind to throttle down, continued in the direction of the hangar, gaining flying speed as he went. Luckily, his left wing extension came into contact with a shutter at the side of the hangar opening, which caused the machine to swerve right round and come to an abrupt stop inside. Little damage was really done to the wings considering the impact, and the pupil escaped with no more than a bad shaking. He got chaffed for bringing his wreckage so obligingly into the hangar!

Amongst the batch of pupils who came from the Salisbury School were a number of Turkish officers and one Bulgarian, Lieut. Loultcheff. The latter was a very apt pupil, who could speak English very well, and he was shaping in splendid style for his brevet. The Turks were much slower, but very brave. They knew very little English, and it was difficult to make them understand how they were progressing in the air. The Bulgarian was allowed the same privilege as our own English pupils, that was, to sit in the pilot's seat, but I could not do this with some of the Turks. Their inability to understand me, and I them, made it impossible for me to take this risk. However, I did my best for them. They were making fair progress but appeared to be frightfully jealous of the Bulgarian, which made things quite exciting at times. One of them in particular had a very bad temper, and it was rumoured that he intended to knife me, because he considered I gave too much attention to the Bulgarian! I had reasons to believe the rumour, too, and I therefore treated him with extra precaution. I am almost sure that he would have reached his murderous ambition had they not been called away very suddenly, without being able even to qualify for their tickets, for war had been declared between Bulgaria and Turkey. Our Bulgarian friend qualified for his brevet in good style and also went to take part in the war. Before leaving, he asked me to go with him "as Bulgaria needed my services badly!" Shortly after his departure a telegram came from Lieut. Loultcheff on behalf of the Bulgarian Government, inviting me to go over at once to fly for Bulgaria. Funnily enough, I also had a semi-official offer from the Turks to fly for them. Both countries offered attractive terms. I did not accept, however, for patriotic reasons. Always a strong believer in Lord Roberts's prophecy that we must be prepared for a big war, I knew it would be with Germany and I felt that my services would be needed by my own country. The Great War was, in fact, brewing under our noses at this very time.

Sabelli, an Italian, and one of the best, with Mr. Snowden Hedley, both Brooklands pupils, set off to Bulgaria without me to engage in aerial warfare.

Sabelli, Loultcheff and Hedley sent interesting postcards from time to time, and although they read only mildly warlike when compared with the affairs of the Great War, one must remember that aviation was not far advanced then. But Sabelli remarked in one of his last communications to me dated 19th December, 1912:

"We are both here (Lieut. Loultcheff and himself) with the escadrille which is watching Andrianople and the adjoining Turkish positions. I have been flying a lot on the Bristol and the Blériot Monoplane and am flying now a very fine 70 Blériot tandem. So far I have escaped to the nasty Turkish shrapnels and hope to bring soon my bones quite safe to England. . . ."

CHAPTER V.—Some Early Pupils: 1912

It would occupy too much space if I were to mention little anecdotes and incidents concerning all my pupils of 1912. There were so many, each pupil being different from the other. As an instructor it was my duty to make my pupils feel that I had a genuine interest in their progress—as, of course, I had—and to smile good-naturedly at some of their feeble attempts, meanwhile fostering them with words of encouragement. By so doing, in this continual round of teaching, a brotherly affection sprung up, and in each individual I had more than a flying interest. I became attached to them and fretted badly when they met with any serious accident in later years.

After pupils had passed out of school days, many of them returned to the old school for joy-rides and practice, from time to time. I was always glad of this because it gave me an opportunity to test their skill as time went on, and to note their progress.

Day by day, things were happening. One noted promotions steadily growing. I chuckled with satisfaction at any slight progress of "old boys" from our Brooklands school. I could not do real credit to many of them even if I attempted to write up their later records. I have completely lost touch with a good many. I propose, however, to make comments on a few. The year 1912 was one which I consider very fruitful for aviation, on account of the number of officers and civilians who qualified at our school and who were ready to go with the first squadrons for active service in 1914. The service officers who passed through in 1912 were of the right stuff to stand the strain of this new calling.

Let me begin with the late Squadron-Commander F. F. Waldron, who, in his pupil days, was a lieutenant. He was only twenty-nine years of age when he fell in action on 3rd July, 1916. He was appointed to the R.F.C. in 1913, and later became an instructor at the Central Flying School. Serving with great distinction in the war, he was mentioned in early dispatches by Sir John French. He held the height record for the Army for several months and was the first to reach Montrose in the famed flight of Army aeroplanes to Scotland in 1913.

There were three of our Brooklands pupils out of the five who participated in flying the machines to the new Montrose Air Station. They were Captains C. A. H. Longcroft, Becke and Waldron. They set off from Farnborough on what was then considered a very long journey of some 450 miles, and in spite of very bad weather they all arrived at Montrose safely, each after experiencing difficulties in the fog and being forced to land at various places en route. It was a remarkably fine effort for those days.

Waldron wrote to me from the new Panmure Barracks, Montrose, soon after his arrival. His letter referred to the sad death of Geoffrey England, who was a brother of the well-known designer Gordon England, himself still prominent in the aircraft world. He was killed when his Bristol Monoplane collapsed in the air, a very rare occurrence in these enlightened days.

Longcroft also wrote to me whilst on this memorable journey from Newark, Notts:

"Three of us arrived here from Towcester to-day. It is slow work as the weather is damnable, either fog or blowing hard, or both. Hoping you are going strong."

Major J. F. A. Higgins, D.S.O., had served in the South African War, 1899-1902. No doubt his previous service experience was largely responsible for his being such a wonderfully apt pupil. He always kept strictly to instructions, and this made it so much easier to teach him. Soon after he qualified he was made Flight Commander, R.F.C.—this in 1912.

Some quickly mastered the gentle art of flying. Sidney Pickles, for example, was the easiest pupil I taught round about that period. Flying was second nature to him. He was over-confident at times, but that was his only fault. His ambition brought him easily to the front row of our best pre-war test pilots. Others needed much coaxing and patience, but I often found the slow ones turned out to be the steadiest pilots. R. H. Barnwell had almost despaired of becoming a pilot, as he was very slow in his movements at the controls and inclined to be heavy-handed. At one stage he became very depressed and asked me to tell him candidly whether I thought he would ever turn out to be any good. Encouragement and patience in the end had the result of the much-coveted brevet, and I never regretted the extra time and care given to him. It was well worth it. He joined Vickers soon after getting his certificate and became chief pilot instructor there. He did excellent work as an instructor and tester.

Major the Hon. Claude M. P. Brabazon, after learning to fly, switched over to airships.

Major E. B. Ashmore, M.V.O., was rather a slow and difficult pupil to teach, this being probably due to his age, which was over the average for pupils who took up flying. He was very heavy in handling the controls and consequently on several occasions we had narrow shaves. In 1916 he commanded a Brigade of the Royal Flying Corps before becoming responsible for the air defences of London.

Lieut. C. G. S. Gould served in No. 4 Squadron, 1913-14. He was an instructor at the Central Flying School in 1914 and later served in France.

2/Lieut. P. H. L. Playfair was another pupil who, I remember, had the makings of a first-class pilot, which his record later proved. He served during the war in France, commanding flights and squadrons, and was appointed Commandant at the Central Flying School, 1919, as Wing Commander. Besides the Military

Cross he was awarded the Russian Order of St. Stanislas and the American Distinguished Service Medal.

Lieut. P. J. Joubert de la Ferté served in 1914-15 in France, 1916-17 in Egypt, 1917-18 in France and 1918-19 in Italy. He holds the Italian Order of St. Maurice and St. Lazarus, and the Croce de Guerra.

I had reasons when running my Aviation Bureau in London in 1928 to write to Air Vice-Marshal Joubert de la Ferté. When I received his reply I was amused at his concluding remark: "Your telegraphic address recalls visions of the sewage farm at 50 feet." My telegraphic address was "Exboxkite"! I was pleased that he remembered one of the Brooklands characteristics. He was a first-class pupil.

Lieut. F. A. Wanklyn, inventor of the "Wanklyn Dart," came through the war safely and reached the rank of Lieutenant-Colonel, with the M.C.

Capts. H. F. Glanville and D. R. Hanlon also survived the war.

Lieut. L. Da Costa Penn-Gaskell went out with the first squadrons in 1914 and died on 4th February, 1916, of injuries received whilst on duty. I refer later to his self-sacrificing devotion to his pilots.

Lieut. F. V. Holt was one of six pupils who received their tickets all on the same day, 1st October, 1912. He showed great promise as a pupil, but was retiring and shy, and for this reason photographers could never get his picture. He would pose with us all in a group, but had a knack of dodging behind somebody else, just in time to avoid the click of the camera. He was unfortunately killed in an air collision years later after very distinguished service. He joined No. 4 Squadron in France at the beginning of the war. In February, 1915, he was made a Companion of the Distingushed Service Order for gallantry, in engaging singlehanded a group of twelve German aeroplanes which were attacking the town of Dunkirk. He was subsequently joined by two of our own biplanes, which resulted in one of the German machines being brought down and the capture of the pilot and observer.

He was made Squadron Commander in the same month and appointed to command the newly formed No. 16 Squadron at La Gorgue. No. 16 Squadron consisted of flights from Nos. 2, 5 and 6 Squadrons and took a distinguished part in the battles of Neuve Chapelle and Aubers Ridge, equipped with one B.E.2a, two B.E.2c.s, three Voisins and four Maurice Far-

mans. In April, 1918, he was appointed to command the 9th Brigade with the acting rank of Brigadier-General.

I enjoyed teaching some pupils very much more than others on account of their special aptitude. Group Capt. Carmichael, D.S.O., A.F.C., q.s., R.A.F., was particularly gifted for flying. He was attached to the R.F.C. in 1912, served in France from August, 1914, until 1917.

Another group of five keen pupils secured their tickets on 22nd October, 1912. They were Capt. R. Boger, Lieuts. A. M. Read, G. Pretyman and F. E. Styles, and Mr. A. Payze. The first three officers went with the original three squadrons to France in 1914. The last-named came through the European War safely and was the first British entrant for the transatlantic flight in competition for the Daily Mail £10,000 prize.

Lieut. G. Pretyman (later Wing Commander, D.S.O., O.B.E.) was an instructor at the Central Flying School in 1915. He commanded No. 1 Squadron in 1915-16 and was Staff Officer under the Director of Training, Brig.-General J. G. Hearson, D.S.O., in 1918.

Lieut. the Hon. J. D. Boyle was one of the original Flight Commanders of the R.N.A.S. when that Service came into formation in 1914, and had done wonderfully good work for aviation.

I remember that Lieut. R. P. Mills was a really wonderful beginner, very cool and with a fine touch. I see now that he started as he obviously intended to go on throughout his flying career. He entered the R.F.C. in 1912 after leaving our school, and became an instructor at the Central Flying School in 1915. He served in France, 1914-15, and in France and Italy, 1915-16. He earned the M.C., Italian Order of St. Maurice and St. Lazurus, the French Legion of Honour and the Croix de Guerre.

Although Lieut. A. Shekleton did not take his ticket until January, 1913, he really belonged to the year ending 1912. He was young and needed understanding with tuition. He was seconded to the R.F.C. from the Munster Fusiliers in 1913, served in France 1914-15, and again in 1917, then in Egypt 1917-18. He won the D.S.O. and O.B.E.

Lieut. J. Empson was killed on 15th May, 1914, on a B.E.2 Tractor Biplane (70 h.p. Renault), with his passenger, Air Mechanic Cudmore. Both were killed when they struck a hedge landing in a dense fog. It was sheer bad luck. I had looked forward to seeing this young officer climb to a high rank, for although

he was slow to begin with he picked up towards the end of his tuition days and had the makings of an excellent pilot. In a letter he refers to the death of Mr. E. Petre, who was known to us all in those days as "Peter the Painter," and whose brother, Major Petre, whom I have already mentioned elsewhere, was known as "Peter the Monk"!

"How awfully sad it is about Petre's death. Would you tell Mrs. Handasyde, if she is getting up a subscription for a wreath or anything of the sort, that I would like to subscribe to it. I lodged with Mrs. Bullen with him, so I knew him quite well and liked him very much. I was very shocked to hear of the accident.

"I cannot understand him trying such a flight on such a day; as up here, which is not very far from where the accident happened, there was a strong gusty wind with some rain all day, most unsuitable for flying. Still he seems to have made a good fight for it and I expect he would rather have died that way than any other."

Empson's letter refers also to a very familiar name, Mrs. Handasyde, the wife of Mr. G. H. Handasyde, a well-known pioneer designer of the Martinsyde aeroplanes, in one of which Petre was killed.

I remember Mrs. Handasyde was collecting autographs of all the flying men of that day, and embroidering them on an afternoon table cloth, a most unique idea. It would be a relic to-day if she still had it.

Now for just one more pupil who managed to get his ticket at the end of the year, Capt. D.W. Powell. He was peculiarly reluctant to fly alone, even when he was quite capable of doing so, and I flew as his passenger for a good while before I could persuade him to go alone. When he eventually did his first circuit alone he was so pleased and confident that he asked to be allowed to take his brevet test right away. This he did, and everyone remarked how well he flew, little realizing that he had made many circuits before with myself sitting like a dummy in the back seat!

To sit alone in the pilot's seat of a box-kite at 1,000 ft. or more presented to some pupils an uncanny feeling of loneliness or emptiness. The sensation, if I can describe it, and if readers will try to imagine it, might be like sitting on a small backless seat suspended in mid-air, with uninterrupted space all around, above and below, and in the blast of the wind and roar of the engine.

Capt. Powell never told me of his nervousness, but I instinctively detected it in him, as I had in others. Many pupils were glad to get into the tractor types, which were partially closed in, on this account. I have often wished I could take some of our modern pilots up in a box-kite and study their reactions!

In conjunction with Colonel Lindsay Lloyd, the well-known Brooklands track official, I arranged to give our young visitors to the aerodrome a treat, and so it was that Santa Claus became air-minded in 1912, but in spite of his up-to-date conveyance, had to postpone his visit until 13th January, 1913, on account of the weather. The Press described the event as follows:

"An unusually large number of children turned up on that afternoon, for they had been informed that no matter what the weather was like Santa Claus had definitely promised to fly to Brooklands and bring with him a goodly store of gifts. When Major Lindsay Lloyd announced that he had received a telephone message to say that Santa Claus was well on his way and might be expected in about a quarter of an hour, the youngsters could hardly contain themselves, and many keen pairs of eyes were directed skywards. Shortly after, a cry went up, 'Here he comes,' and sure enough it was a Bristol biplane with Santa Claus at the helm, his traditional beard flying in the breeze and his magic sack of presents on his back. A great roar of welcome went up from the children, to which Santa Claus responded by gaily waving his hand, and after making several graceful circuits he swooped down and effected a very clever landing right in front of his young friends, to whom he made a brief speech and commenced distributing his gifts with a lavish hand, each child carrying off a present. Nearly 400 children were participants, and they showed their appreciation by giving three hearty cheers for Santa Claus, and one for his flying machine. . . So perfectly was Mr. Merriam disguised that his friends failed to recognize him."

To sum up the work of our school, which headed the list of pupils taught in the year ending 1912, as compared with other existing schools of that period, I could not do better than quote from Mr. R. Dallas Brett's marvellously accurate and comprehensive contribution to aeronautical bibliography entitled "The History of British Aviation, 1908-14," published by John Hamilton:

"The record of the British schools for 1912 was as follows:



No. of Pupils

	Scho	ol.		Aerodrome.	trained during 191	
Bristol			•••	Brooklands (e Salisbury Pl	ain	00
C- 1		•		(35)	• • •	98
Graham			- :::	Hendon	• • •	20
Naval					•••	16
C.F. S. ,			•••	Upavon		14
Deperdi	ussin			Brooklands	(5),	
				Hendon (9)		14
Sopwith	ı			Brooklands		11
n::				Hendon		8
Ewen				Hendon		8 7 6 6 3 2
Vickers				Brooklands		6
E.A.C.				Eastbourne		6
Avro	•••	•••		Brooklands		3
Melly		•••		Freshfield (La		2
Hewlett			deau	Brooklands		ī
Ducroce				Brooklands		i
Ogilvie		• • • •		Eastchurch		i
Codv				Farnborough		i
		•••	•••		• • •	i
Handley				Fairlop	• • •	
Lakes	F.S. (Seapl	anes)	Windermere	•••	1
				Total	١	211

"The Bristol Company's effort was truly prodigious. Their gross output of pilots was almost two per week, and their Brooklands branch alone had trained more than three times as many pilots as any other firm in the country.

"Few of the subsidized flying clubs of the present day could equal the output of the Brooklands branch of Bristols, in spite of the accumulated knowledge of twenty years, the dual controls, the telephones, the modern light training aircraft and the elaborate equipment with which they are provided. And if the Government was to equip a modern club with Bristol Box-kites and set them to obtain the same results. . . . ! "

Point-to-Point or Promotion

By T. C. W.

So you think sport is more important than your career in the service, do you? "The twinkle in the C.O.'s eye was not seen by the very junior officer facing him.

"No, sir, but . . ."

Peter was beginning to wish that he had never asked the C.O. whether he could take his promotion exam at some future date as the present arrangements coincided with the Dismounted Units team race in Peshawar. He eventually overcame his nervousness and explained to the C.O. that the race in question

was of some importance as the squadron had won it the previous year and had a very good chance of repeating their success. Furthermore he, Peter, was so junior that he could postpone the taking of his exam without in any way jeopardising his career, whereas he would not have another opportunity to ride in the race.

The C.O. relented and agreed to refer the matter to higher authority. Back came a most uncompromising reply pointing out that young officers should realize that having once arranged to take a service examination they could only cancel their arrangements in the most exceptional circumstances, and that horse-racing did

not fall in this category.

To say that Peter was worried would be an understatement, since the only other person in the squadron who had ridden his horse was riding one of his own in the same race and consequently would not be available. So he decided to make one final effort, and arranged an interview with the Group Captain who, being a keen rider himself, could be relied on to be at least sympathetic. He did in fact agree to send a demi-official letter to Delhi making an impassioned plea on behalf of a certain young officer.

Delhi replied that they sympathized with said young officer but could do nothing about cancelling his entry for the exam. But they added the very practical suggestion that, according to the rules of service examinations, it was only compulsory to sit in the room for half an hour, after which it was permissible to walk out. It was further suggested that this course of action, though it would undoubtedly result in failure in the subject involved, might enable the young officer to reach the course in time.

The Group Captain read the letter to Peter and asked him what he proposed to do. The answer was obvious, but the exam was being held at Risalpur, about forty miles away, which meant that there would have to be some very careful organization if the journey was to be completed in the time. Peter saluted and turned to go, but was called back.

"Who's going to ride your animal if you don't arrive in time?" asked the Group Captain.

"I don't know, sir; that has been one of the main problems all along."

"I'd like to stand by for you if you wouldn't mind me riding him. I think I could get him round the course all right." There was a hint of mischief in this last remark, as the Group Captain was a far better horseman than Peter.

It was therefore agreed that the Group Captain and Peter should walk the course together

the day before the race, and that Peter should then depart by train to Risalpur. He was to make such arrangements as he could to get back in time for the race and the G.C. would change and be ready to ride in case he failed to make it.

The remaining and major problem was the journey between the examination room at Risalpur and the course, which was about ten miles out of Peshawar. It was quite clear that either rail or road would be too slow and the only chance was to go by air. This necessitated finding someone else in the squadron who could and would arrange to visit Risalpur the next day since there could be no question of keeping an aeroplane there overnight at that time.

Bill, another officer in the squadron, agreed enthusiastically to co-operate, and the C.O. gave permission to use the squadron touring car on repayment. The plan was that Bill should lunch at Risalpur and leave for Peshawar exactly half an hour after the exam started and Peter would go with him. He would then board the car which would be waiting on the landing-ground at Peshawar and change on the way to the course. His riding kit was to be put in the car by his bearer. If all went well there should be about fifteen minutes to spare.

Everything had been carefully planned but at the very last moment it seemed as though the C.O. at Risalpur, who shared the views of headquarters on the irresponsibility of young officers, might try to put a spoke in the wheel. Eventually, however, his sense of humour and a reassuring message from the Group Captain got the upper hand and he agreed to the plan.

And so it came about that at exactly half past two on the day in question Peter handed in his half hour's work and departed at high speed in the direction of the landing-ground. The men near the aircraft were somewhat astonished when a very exhausted officer who had covered over half a mile at a speed suggesting that the hounds of hell were after him, though there was no visible evidence of pursuit, took a running jump and disappeared head first into the rear cockpit of a Bristol Fighter which was already on the move. Bill and the Bristol did their jobs nobly but the latter began to show signs of the hurry towards the end of the short journey. Bill and Peter were out of the aeroplane and into the car almost before either had stopped and started off for the race-course.

There had been a certain amount of rioting in the district and as a result there were Indian guards and traffic-check points in various places. At least one guard got a shock when he opened the door of a car and found Peter with nothing on but a light blue shirt. He thought that it was unusual, but the array of discarded clothing explained the situation and the language of the occupants of the car made it clear that they were in a hurry and he accordingly shut the door and allowed them to proceed. They were not stopped again and arrived, believe it or not, with almost exactly fifteen minutes to spare, and found everything arranged according to plan.

The Group Captain was plainly sorry not to be riding himself and he had been such a thorough sportsman throughout that Peter was almost sorry too. They wandered round the paddock together and were discussing various points with other members of the team and their friends when someone walked up to one of the party and addressed him.

"Hullo, Smith. Pity about your horse refusing in the last race. Bad luck. By the way, I've a lady over here who would like to meet you."

"All right. Excuse me, you fellows, please." Having caught a wink from the man who had addressed Smith, Peter and another man unostentatiously followed them. Judging from the appearance of the lady who wanted to make his acquaintance, Smith was a very lucky man. He was duly introduced.

"Oh, Captain Smith, I do hope you did not mind being dragged away from your friends, but I did so want to meet you, and Johnny here said he'd introduce me."

"Not a bit. In fact I'm delighted. I did not know Johnny was so unselfish."

"I enjoyed watching that last race, Captain Smith. Bad luck your horse refusing near the end like that. I thought you were riding him so nicely too."

Smith blushed and acknowledged the compliment as the damsel continued.

"And I always like to hear a rider talking to a horse too. Do you often talk to yours? I do."

"No," said Smith, "I don't very often converse with the animal. Only on special occasions and in moments of stress. Oh, there's the saddling bell. Will you excuse me, please?" and off he went.

His introducer could contain himself no longer and as soon as Smith had gone he burst out laughing. When his friends eventually calmed him down he explained that he and his charming companion had been standing by the jump at which Smith's horse refused. He was asked how the lady knew that Smith talked to his horse. "She's heard him personally," he explained. "He was addressing the creature in

very plain English. While adding weight to his words with his whip he was telling it to 'jump you lazy ——! Will you —— well jump?"

The party dispersed as the horses in Peter's race were just going down to the start.

The race itself was exciting since both individuals and teams claimed the interest of the spectators, but we are not concerned with the details. Peter finished second, one length behind a member of another team, and the other two of the squadron team were fourth and ninth. Some minutes later, when the names and numbers had been checked, it was announced that the squadron had won the team event.

Peter himself was naturally excited over the fact that all the worry and planning of the last two weeks had been worth while and that the results were likely to give some measure of satisfaction to those who had helped him. The immediate problem was to catch a train back to Nowshera, where he had arranged for a car to meet him. He collected two large tankards at the prize-giving, and then made a rush for the station in the squadron touring car.

It had been his intention to change back into his normal clothes in the car but, owing

to the rough roads and the hurry they were in, and the presence of various supporters who were going to see him off, this plan had to be abandoned in favour of changing in the train. Peter reached the station at the very last minute and had to climb into the first suitable carriage he came to. The occupants began to wonder what was happening when he arrived in a hurry, still in his racing clothes. There was, however, no time for argument since the train left at once. Furthermore, there was no question of changing in the train.

When he reached Nowshera, Peter's dress, as he wandered about in the dusk looking for his car, caused a certain amount of comment. The car was not there and the only alternative was a tonga. Another man was just taking the last one when he reached the "cab-rank" but kindly offered to share it if they were going in the same direction. Fortunately they were.

Thus, to finish what will also seem to him to have been the fullest day of his life, Peter arrived back at his Mess in a tonga still dressed in racing kit, with his normal clothes under one arm and the results of his efforts under the other. What is more, he was in time for dinner.

Beginner's Luck

A CRAZY POINT-TO-POINT

By T. C. W.

TEVER having ridden in a point-to-point in England, it was my intention to have one race prior to the R.A.F. meeting at Boothby. With this object in view I had got the "Orphan" and myself trained and pretty fit. The day before the race we went out to do a normal pipe-opener on the aerodrome. After trotting about and warming up we set off. After about 200 yards, so quickly that I could only just get my feet out of the stirrups in time, the saddle slipped back and under the horse. I went with it and, before coming to rest, collected three smart kicks on the head, as a result of which the "Orphan" was lame for a fortnight. He never kicked me on the head again! It did not improve my head either and my unfortunate parents had to visit me in hospital instead of on the course. Fortunately we both recovered in time for what was to be a great day for us.

I ought to have ridden him in a breastplate but was dissuaded from doing so by various well-meaning friends who knew more about the business than I did; at least I thought so then. By way of a joke, however, I said that if I could not use a breastplate I was going to put a chalk-mark on the horse's withers. The moment it appeared I should know that the saddle had slipped back far enough and I was going to stop. I did not want to lame the horse again by getting my head mixed up with his feet.

We duly appeared in the paddock with the others and I was informed, much to my surprise, that "Orphan" was favourite. Obviously the local inhabitants knew the horse but not the rider. There was, as a matter of fact, only one horse that I was afraid of, although many of the other riders had far more experience than I. In due course we started and this other horse and "Orphan" managed to get clear of the rest by the first fence. About half-way round the course there was a very large open ditch (it stopped all but one in another race)

and shortly after negotiating this the confounded chalk-mark appeared. We took one more fence and then I stopped to adjust the saddle. This was accomplished with the assistance of a spectator, and just as I was remounting someone shouted to me that there was only one horse ahead of me as all the others had refused or fallen off at the open ditch. This was not much comfort since the other horse had a lead of a full half of the circuit. However, we had to go twice round and anything might happen on the second. It did. Unknown to me the leading horse refused at the same ditch and threw his rider. The latter had remounted, failed to get his horse over and had, also unknown to me, waited for me to give him a lead. So intent was I on getting over this awe-inspiring obstacle that I never noticed him at all and calmly completed the course thinking I had come in a very poor second. The laughter and, as I thought, sarcastic applause from the spectators seemed to confirm this. My father, with tears of mirth coursing down his face, came and led us in, shouting congratulations above the noise. It was only then that I discovered what had happened and that we had won.

A cousin who had backed us was very angry as she had torn up her bookie's ticket in disgust when we had stopped to adjust the saddle; and a farmer friend thumped me on the back and said he had "never seen half a crown go so far away and come back again with interest." It was at this meeting that a horse, definitely touched in the wind, was roaring his way up the straight when a voice from the crowd yelled "'Ere, give him a cough-drop, Mister."

I learnt a lot from all this and had much fun out of it both at the time and afterwards, though as an exhibition of horsemanship or race riding it was, of course, deplorable. However, it did nobody any harm and gave a lot of amusement to many.

Night Fighter Goes Home

BY FLIGHT LIEUTENANT W. THOMAS INGHAM, D.F.C.

HE blue unclouded weather is left in the Mediterranean. The ship is now in the cold waters of the North Atlantic and with each roll the boat creaks like a giant turning in bed. The spray hisses along the side of the ship and the straining and creaking rise to an awful crescendo. All the time you lie secure under the sleep-warm blankets and find yourself saying with Caliban:

"The isle is full of noises

Sounds and sweet airs, that give delight and hurt

Sometimes a thousand twangling instruments Will hum about mine ears; sometimes voices, That, if I then had waked after long sleep Will make me sleep again."

The scene becomes the garden shelter at home when you were a boy and sheltered from the rain under its roof of corrugated iron. The staccato rhythm of the rain and the music of the water as it poured off the roof brought a thrill of comfort. The storm had no power against you, because you had faith in your shield against the enemy. Once recalled to the house the adventure was gone, the storm was only passing rain that licked the window panes and distorted the view for a while.

Flying was sometimes like that. You sat side by side with your pilot in a little cabin. . . . The moon and you are racing along, in and out of cloud, and the pitiless Mistral is making a fury of the sea and, even at two thousand feet, particles of salt begin to form on the windscreen. You feel small, insignificant—but secure. There is comfort in the steady beat of the engines, in the dials glowing on the instrument panel, in the navigation board pressing against your knees, in your pilot's gloved hand poised on the control column. Then sometimes you forget you are in an aeroplane and can feel the still incurious silence of the sky. And you are alone, lost as on some eerie snowbound waste, and want to call out and demand to be recognized, tell the wilderness of cloud and cold stars that you are alive. Alive! But, if you break the silence, down may come some invisible avalanche. You smile at your fancy and find yourself back in the cockpit with its familiar oily warmth. China is saying: "How long now for landfall?"

The giant turns in bed. England is not so far away. There was an earlier time on a similar troopship, on as rough and as wild a sea, when the squadron was doing the outward journey. Duties were slight except during the first days of the voyage, when there was a great spate of letters to be censored. And this duty was to find that all humanity thought the same thoughts. All the world was proud not to have been seasick, or

now to have recovered, to have slept in a hammock, to be able to purchase cigarettes free of tax. All the world had been away only a few ciays, but it wished it were back home. But were there not two voices crying in the wilderness? One a poet, doing duty by the guns, had "seen the dawn come sharp and sudden, and watched the sea till it became rippling gold." Another gave his address as "Nowhere in England."

It was dull the first part of that voyage and amusement was hard to find. Day after day a thick layer of stratus pressed down upon us. The ship's library was a meagre one; for the most part it was composed of books cast out during the earlier salvage drives when instinct was to give away only the least attractive books—Victorian novels mostly. There were two copies of "The Channings," an Evans Wilson, several Marie Corelli's and, as if to represent a more modern and sophisticated age, a soiled "The Well of Loneliness." At last, with surprise and delight, you found a book you had been wanting to read; no one else had grabbed it first or even given it a second glance, for it looked cumbersome and its covers were torn off. Vera Brittain's "Honourable Estate" kept you busy and thinking hard for the next few days and you were lingering on the last hundred pages when the heavy sky suddenly became a dappled blue and high above appeared the sun. This was the signal for everyone to become affable; the "brown jobs" stopped playing bridge, and at last there were vacant seats in the lounge, and the "blue types" stopped "binding." Khaki and blue alike threw off their reticence as they changed into tropical kit and crowded on to the boat deck, laughing at and with one another. The wind was brisk and swept the spray high into the air. Face and hair became caked with salt and buttons turned purple and brown. You remember your face stinging that night as you lay in bed following the progress of Ruth Allermayne to the last page of the book and thought how the First Great War had brought franchise to women, flooding in on a great wave and swallowing Mrs. Pankhurst and her followers. You wondered if this war would bring the social progress for which Ruth Allermayne and many a one like her had worked as if they, too, had hardly existed. You put down "Honourable Estate" with renewed admiration for that race of women authors of whom Vera Brittain is one of the most gifted, and felt you had been in contact with scholarship and hard work and seeking after truth.

Algiers lay across the bay, a confusion of square white houses climbing the hillside—a jewel under the blue sky, its harbour and dockland a promise of wondrous activity. Then you

were walking the cobbled streets that lead from the port, smelling once more the queer odours of France and gladdened at the naïve method of the French in advertising their wares, at the warning to avoid the "fresh painting," and amused at the Arabs in their multi-coloured rags who slept in the shadow of the side-walk.

Camp was in a grove of pines whose needles fought an unequal battle with the sand for floor covering. As the light softened in the evening the trees took on the tracery of delicate lace and the smell of pine when you took a deep breath was more refreshing than any drink—certainly preferable to the cheap muscat which was on sale everywhere. Down by the sea the breeze was cool and there only, or when you were under your mosquito net, was refuge from the flies.

"Get your knees brown!" they said in Africa when, rather ashamed of our lily-whiteness, we tirst appeared for sunbathing. But it was not long before we were able to pass on the rejoinder to others with the same mock sneer.

The giant turns again on his mighty mattress. You are on the way back. The way back to England. And you don't care whether your skin is bronzed or white. You have been waiting for this for a long time. It wasn't as if you were just returning after a week-end or even after a holiday to find your book still open at the place. Of course things would not be just the same. Time—it was trite to say—did not stand still. The newspapers told of the major changes but nothing of what was going on in the minds of your own friends and in your own home. Influences had been at work to alter not only their way of living but perhaps their opinions, their aims and ideas. Just as yours had altered. And what was it you wanted of England? Sometimes you were desperately clear about the things you wanted and they poured out of your mind in a nostalgic stream. You wanted once more to look down upon lonely Wastwater from the side of Great Gable, to see the wind ripple across the ripening corn and to smell again the lilac after rain, to watch the smoke climbing above a Cotswold roof, to see the blue mist settle at the feet of trees, to touch the glossy horse chestnut . . . simple things mostly, not bought for money but dearer to the heart for being so out of reach. Sometimes, of course, England meant just the opposite of wherever we happened to be. Green after dust, quiet tones after garish colour, convenience after makeshift: all these things were everyone's desire. Now you would be thinking of what sort of a job peace would bring. Did you want something of a crusading nature, something which would help the mangled world to heal the quicker, something to do with the reconstruction the Press were so fond of mentioning? Or did you—as you were so often tempted to think—want to put slippered feet on the mantelpiece and shut out the clamour of humanity? Often the dream-future appeared as a strange abstraction, a whirling microcosm: music in a room, music that flowed with magic liquefaction, music that throbbed with the heart and swelled to a great chorus till it slashed the air with colour and painted flowers and trees on the walls; flickering shadows of firelight . . . lights that dance in the eyes of her.

It was all an escape. Escape from the war and its destroying train, from a shattered world, from its feverish uproar and haste to succeed. But you knew there was really no escape, no hiding away, that happiness is no brother to the human ostrich.

In the opposite bunk lies Gustay. His breathing can be heard in long, regular sighs whenever the restless giant lies still. Gustav is a Pole with an unpronounceable name. His story is that of many of his countrymen flying with the Royal Air Force. From what little he tells you and from other people you build up his story of escape when Warsaw was destroyed, service with the French in France and later with the Lafayette. Squadron in North Africa, then transfer to England. Like many another Pole, he has no home, no family. But he smiles and his bitterness he keeps only for the enemy. His smile is one of pleasure when he meets you, and one which gives pleasure. You remember him back at home in the Swafton Mafekin days flying a Spitfire on daily fighter sweeps, on nightly sing-songs with Scotty at the piano. At Dieppe he shot down two F.W.190's in less than five minutes and from St. Nazaire brought back his Spit with less than half a rudder and elevator. He was always placid, unpretentious and ready for the next job. He grumbled only when the task in hand was unlikely to produce "trade." Transferring to Mosquito aircraft, Gustav joined a night intruder squadron and, flying from Sardinia and Malta, found plentiful targets in Italy and Southern France. He quickly became as skilful in attacking motor transport columns and railway trains as he had been in air combat and soon had his squadron's top score for these targets. You remember his being debriefed one night.

"What's your score to-night," Gustav?"

"Two railway engines, some trucks and one railway station."

"Destroyed, damaged or frightened?"

"Destroyed."

"Did they burn?"

"Exploded. Loading ammunition, and went up after the second attack." There is not a sign of emotion or excitement as he makes his terse replies. Damage to ground targets was often hard to confirm, but when Gus said he "destroyed" there was never any doubting. If Gus did not die in the air what sort of future was there for him? Flying against the enemy was his life and to crush the tyranny of Germany seemed his only aim. Or were there other thoughts as yet unspoken, a vision of a free and reborn Poland in which there was a place for him? Perhaps now as he slept that was his dream.

In the other two bunks, rolling as the ship rolls, are Barbarossa, large, red and shaggy—he needs to shave twice a day—and a South African pilot whom we have nicknamed Springbok Joe. Barbarossa has a handshake like a tourniquet and an honest face, but suffers—and his companions, too—from the too much sand he has collected in his shoes, from too much sun for too long. In his more lucid moments, however, he has an arresting conversation. His desire is to become a Member of Parliament and he intends to state the case for the younger generation.

Springbok maintains that South Africa is the land of promise and as we listened last night to his impassioned panegyric we were translated from our cabin to this chimerical region where in agriculture as in industry, in the professions and in commerce, fortunes abound and, like the oranges and peaches on the trees, are ripe for plucking.

Everyone had his way of escaping, of hurrying away from the past and from the present, clutching at the future and hoping to strike a safe harbour. We were all savouring the prospects of life beyond the war. But could we escape? We had learnt to destroy and to kill, we had learnt that at a second's pressure on a trigger a flying aircraft could burst apart and fall like a shower of dead leaves, that its metal skin could burn white-hot. We had felt sick sometimes in body and spirit at the sight of the destruction we had wrought; we had also felt the devilish glee of those moments of success.

You had railed against fate when Tommy ran into an errant petrol bowser, Robin Wills vanished without trace, Bill Norris was drowned. Max and Shaw went out of control in a violent storm, Rennie ditched, Lon ran into a flock of enemy fighters, Toby went missing over Berlin . . . but in the end you became hard. Was it that you were more accustomed to accept the inroads that fate made into your life and into the lives of your friends, or were you becoming unfeeling? Sometimes your heart felt brittle, infertile, so that you could neither trust yourself even to write a letter nor settle to read a book. Your power to appreciate the simple joys of life and of Nature had deserted you. Life was to be lived up to the hilt, to move along at such a pace that you had

not time to stand and stare. Between sorties there were parties and time for testing as a steady drink the relative merits of cognac or vino; there was the singing of bawdy songs till the words grew tired and meaningless so that when someone produced a copy of Mrs. Curwen's "Community Songs" it was hailed as a magic discovery, and sea shanties and folk songs were rendered with great heart.

But things would be different, perspective would right itself again, when you got back to England. There would be no more of these disturbing anomalies once the war was over and we enjoyed the "dividends" which seemed the rightful claim of those who took up arms.

"Cheer up, Tommy Atkins, Be a stout fellah."

The words are singing in your head, the words that China and you have often sung over the intercom to break a long silence when landfall seems a million miles away and you are cold and weary of the din of the engines, words which you had also sung with elation over the R/T to whatever ground control stations happened to be listening on your channel as you came back from a particularly satisfying trip.

"Had some fun, Bostick Leader?" one of

them might chip in.

The future did not hold all the good things. There was much in the past that you wanted to remember. Whenever the squadron had been detailed for a special job, often at short notice, its own special brand of helpfulness, team spirit—call it what you will—infused the camp. It was often there as when we were assigned to the Danube shipping for the moon period or called to destroy a column of 200 M.T. vehicles our neighbouring Spitfire squadron had trapped in a narrow valley, when we patrolled the Greek airfields to prevent the enemy escaping by air or provided

escort for H.M.S. Renown with the Prime Minister on board, at Anzio or when we had moved to the Adriatic battle front and by studying our opposite number in the enemy camp had been able to anticipate his night activity and end it. No moment was ever more thrilling than to bring your engines to a standstill and feel the silence surging over you, to hear the clicking of the cowlings as the hot metal cooled down, to see in the light of your landing lamps the erks crowding round to examine the aircraft for battle scars and to inquire with human voices if you had had any luck . . . especially if you had. Then were you able, with assumed nonchalance, to relate how the enemy had met his end, to speak of tracer and flames and smoke, of visuals, or tight turns, spins and dives, of how in the end he hit the deck -as if these things were of no greater importance than the operation of lighting your cigarette.

These and a thousand other events were all fitting into the pattern of our experience, all helping to build the fabric of the future. There had been rare moments of unspoken communion when we had huddled round a home-made stove in a tent in Sardinia during a great snowstorm, when we had stood at a grave, glimpses of fair vistas flying above lovely Taormina and watching the early sun flush the snows of Etna, the Pyrenees looking like crinkled silver paper in the moon, the fantastic shapes and exquisite tones of the Dolomites, Capri, its toppling cliffs streaked with colours as if paint had been spilt over them, the Forum where the ancient Romans step out of history into life, the black shadows and cream sunlight of Malta. . . .

The future and the past were irrevocably linked

together.

The sea is calm now. There is only the drowsy, steady, pulsing note of the engines and the gentle lift and fall of the bows as we head northwards. The giant lies sleeping.

Victoria Crosses

The King has been graciously pleased to confer the award of the Victoria Cross on the undermentioned officers in recognition of conspicuous bravery.

ACTING SQUADRON LEADER IAN WILLOUGHBY BAZALGETTE, D.F.C. (118131), R.A.F.V.R.

635 Squadron. (Deceased.)

On 4th August, 1944, Squadron Leader Bazalgette was "master bomber" of a Path-finder squadron detailed to mark an important target at Trossy St. Maximin for the main bomber force.

When nearing the target his Lancaster came under heavy anti-aircraft fire. Both starboard engines were put out of action and serious fires broke out in the fuselage and the starboard mainplane. The bomb aimer was badly wounded.

As the deputy "master bomber" had already been shot down, the success of the attack depended on Squadron Leader Bazalgette, and this he knew. Despite the appalling conditions in his burning aircraft, he pressed on gallantly to the target, marking and bombing

it accurately. That the attack was successful

was due to his magnificent effort.

After the bombs had been dropped the Lancaster dived, practically out of control. By expert airmanship and great exertion Squadron Leader Bazalgette regained control. But the port inner engine then failed and the whole of the starboard mainplane became a mass of flames.

Squadron Leader Bazalgette fought bravely to bring his aircraft and crew to safety. The mid-upper gunner was overcome by fumes. Squadron Leader Bazalgette then ordered those of his crew who were able to leave by parachute to do so. He remained at the controls and attempted the almost hopeless task of landing the crippled and blazing aircraft in a last effort to save the wounded bomb aimer and helpless air gunner. With superb skill, and taking great care to avoid a small French village nearby, he brought the aircraft down safely. Unfortunately, it then exploded and this gallant officer and his two comrades perished.

His heroic sacrifice marked the climax of a long career of operations against the enemy. He always chose the more dangerous and exacting roles. His courage and devotion to duty were beyond praise.

905192 SERGEANT (NOW WARRANT OFFICER) NORMAN CYRIL JACKSON, R.A.F.V.R., 106 Squadron.

This airman was the flight engineer in a Lancaster detailed to attack Schweinfurt on the night of 26th April, 1944. Bombs were dropped successfully and the aircraft was climbing out of the target area. Suddenly it was attacked by a fighter at about 20,000 feet. The captain took evading action at once, but the enemy secured many hits. A fire started near a petrol tank on the upper surface of the starboard wing, between the fuselage and the inner engine.

Sergeant Jackson was thrown to the floor during the engagement. Wounds which he received from shell splinters in the right leg and shoulder were probably sustained at that time. Recovering himself, he remarked that he could deal with the fire on the wing and obtained his captain's permission to try to put

out the flames.

Pushing a hand fire-extinguisher into the top of his life saving jacket and clipping on his parachute pack, Sergeant Jackson jettisoned the escape hatch above the pilot's head. He then started to climb out of the cockpit and back along the top of the fuselage to the starboard wing. Before he could leave the fuselage his parachute pack opened and the whole canopy and rigging lines spilled into the cockpit.

Undeterred, Sergeant Jackson continued. The pilot, bomb aimer and navigator gathered the parachute together and held on to the rigging lines, paying them out as the airman crawled aft. Eventually he slipped and, falling from the fuselage to the starboard wing, grasped an air intake on the leading edge of the wing. He succeeded in clinging on but lost the extinguisher, which was blown away.

By this time, the fire had spread rapidly and Sergeant Jackson was involved. His face, hands and clothing were severely burnt. Unable to retain his hold, he was swept through the flames and over the trailing edge of the wing, dragging his parachute behind. When last seen it was only partly inflated and was burning in a number of places.

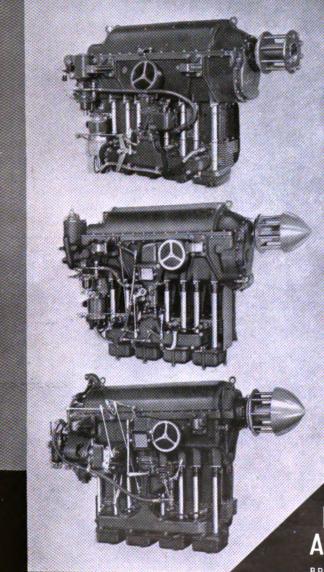
Realizing that the fire could not be controlled, the captain gave the order to abandon aircraft. Four of the remaining members of the crew landed safely. The captain and rear gunner have not been accounted for.

Sergeant Jackson was unable to control his descent and landed heavily. He sustained a broken ankle, his right eye was closed through burns and his hands were useless. These injuries, together with the wounds received earlier, reduced him to a pitiable state. At daybreak he crawled to the nearest village, where he was taken prisoner. He bore the intense pain and discomfort of the journey to Dulag Luft with magnificent fortitude. After ten months in hospital he made a good recovery, though his hands require further treatment and are only of limited use.

This airman's attempt to extinguish the fire and save the aircraft and crew from falling into enemy hands was an act of outstanding gallantry. To venture outside, when travelling at 200 miles an hour, at a great height and in intense cold, was an almost incredible feat. Had he succeeded in subduing the flames, there was little or no prospect of his regaining the cockpit. The spilling of his parachute and the risk of grave danger to its canopy reduced his chances of survival to a minimum. By his ready willingness to face these dangers he set an example of self-sacrifice which will ever be remembered.

Printed and Published in Great Britain by GALE & POLDEN Ltd., Wellington Works, Aldershot. Overseas Agents, INDIA: Thacker, Spink & Co., Calcutta and Simia. Thacker & Co., Ltd., Bombay. Higginsonhams, Ltd., Madras and Bangalore. CANADA: Wm. Dawson Subscription Service, Ltd., 70, King Street East, Toronto, 2 Canada. AUSTRALIA and NEW ZEALAND: Angus & Robertson. Ltd. SOUTH AFRICA: W. Dawson and Son (S.A.) Ltd., 29 and 31, Long Street, Capetown.

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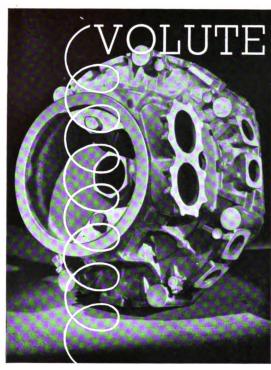
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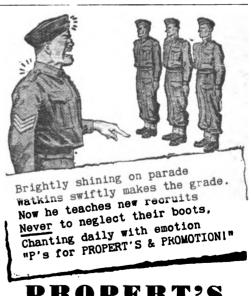
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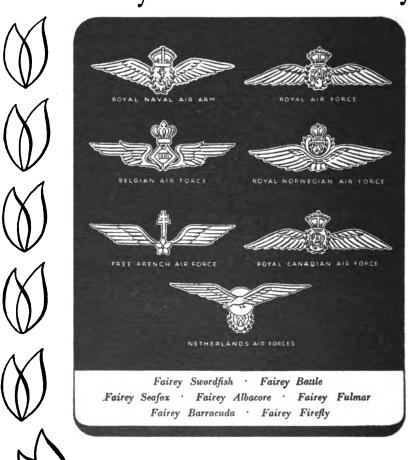
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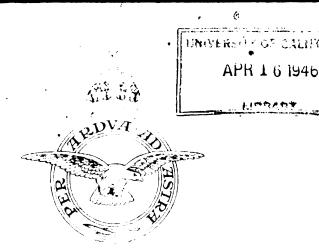
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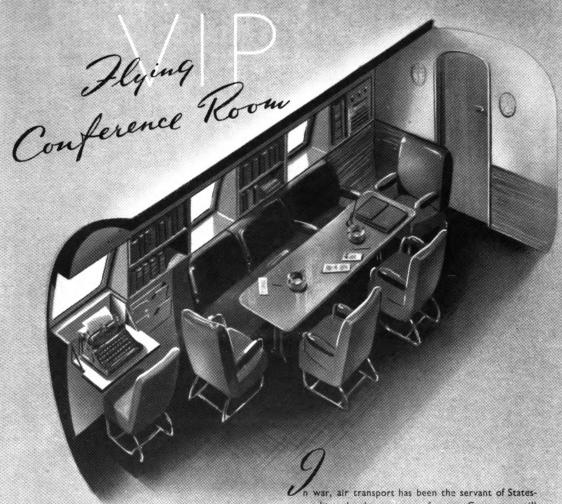
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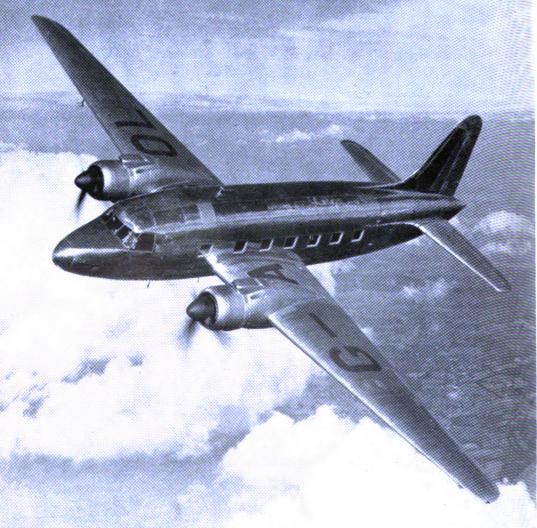
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THE ROYAL AIR FORCE **QUARTERLY**

EMPIRE AIR FORCES JOURNAL

EDITOR:

WING COMMANDER C. G. BURGE, O.B.E., q.s., R.A.F. (Retd.)

Assisted by an Advisory Committee of Members of the R.A.F. and Air Forces of the Dominions

VOLUME XVII

MARCH, 1946

NUMBER 2

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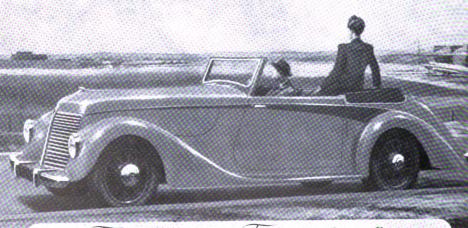
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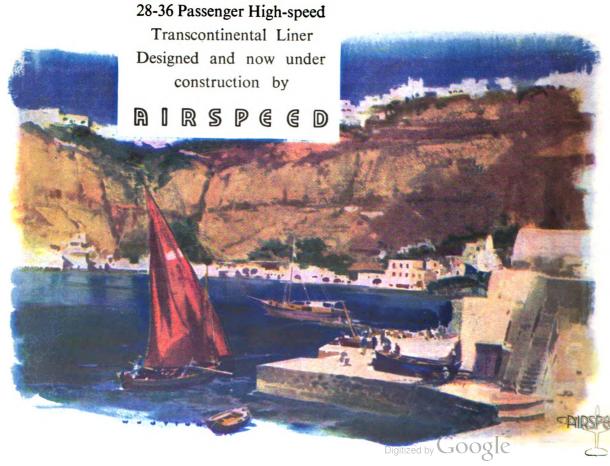
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EDITORIAL

The Future of the Services

T is an encouraging sign of the times that the general public—and the experts—are not falling into the oft-repeated error of assuming that every new weapon makes old weapons useless. Lord Trenchard, in the House of Lords on 14th November, 1945, voiced the general feeling when he said that the discovery of atomic energy and its application as an explosive of unprecedented power would in no way reduce the need for naval, military and air forces. Although the debate was largely inconclusive—the fact is that H.M. Government have not yet decided upon the future of the Fighting Services—several important suggestions were made.

Lord Trenchard himself advocated the further development of the Combined Staff, with representatives of all the Dominions as well as of the three Services, and the establishment of a residential Combined Staff College; he hoped that officers would be chosen, for all three Services, in as wide a variety of ways as possible and that the Short Service System would be continued in the Royal Air Force and applied to the other two Services; and he said that conscription could and should be continued for five years. Lord Cranfield called for more combination at the top in order to ensure effective co-operation farther down and to prevent that deplorable competition between the Services in peace time for a very limited amount of public money. He also suggested the creation of a Ministry for the Coordination of Defence, consisting of a Minister of Cabinet rank, the three Service Ministers (the First Lord of the Admiralty and the Secretaries of State for War and Air) with their three Chiefs of Staff, and the Foreign Secretary.

Lord Stansgate, replying, said that H.M. Government had not yet formed any general plan for the future of the regular Services; but he gave some details of the ancillary organizations of the Royal Air Force. The Air Training Corps, he said, was to continue as a voluntary cadet organization under the control of the Air Ministry; University Air Squadrons were to be revived; the Auxiliary Air Force was to be continued and would be trained to function operationally with the regular Air Force; and the Royal Air Force Volunteer Reserve would be maintained. Referring to the wider question, he said that H.M. Government had no intention of integrating the three Services. As The Times has pointed out, effective co-operation between British Fighting Forces in war can best be achieved by combined training and mutual understanding among formations, and integration at the top.

Finally, it was revealed that the Imperial Defence College will be reopened early this year.

International Affairs

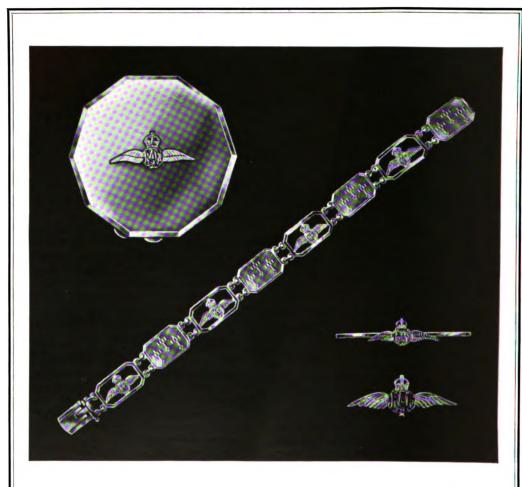
THE UNITED NATIONS ORGANIZATION (U.N.O.)

The first meeting of the General Assembly of the United Nations took place in London on Thursday, 10th January, 1946. It met with the assurance of full British support, expressed by H.M. The King himself at the State Banquet given at St. James's Palace on the previous day.

That some form of international organization is essential is acknowledged on every hand. From statesmen of all nations and from the man in the street come expressions of the conviction that only by the creation and support of some such body can civilization as we know it be perpetuated; and the production and use of the atomic bomb with its immeasurable potentialities for destruction have demonstrated to everyone what scientists and thinkers have known for a long time. Professor Laski aptly expressed this in a speech at New York on 3rd December last year when he said that some form of "planned internationalism—economic, social and political" was necessary.

But since this involves a certain giving up of national sovereignties, it must not be assumed that any of the free nations of the world are yet prepared to give up their sovereignty. Whatever they may be prepared to do at some future time, such a hope is premature to-day. Political development takes place slowly, and any attempt to hasten it inevitably results in disaster; but that a World Federation will come eventually is a legitimate aspiration.

Meanwhile, the United Nations Organization deserves and enjoys the support of all humane and right-thinking men and women. Moreover, it is clear, from the San Francisco Charter, that its architects have profited by experience of the faults and mistakes of its predecessor, the League of Nations; and it is noticeable that the nations of to-day are determined to make this second attempt a success. It starts with manifold advantages over its forerunner. It has, from the beginning, what the other had not: the support of the United States of America and the Union of Soviet Socialist Republics; and it has a Security





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Council with power to initiate action for the rectification of any circumstances that endanger the peace of the world, and to call upon the armed forces of the member states to implement its decisions.

One of the first duties of the General Assembly will be to appoint an international committee for the proper control and development, for peaceful purposes, of atomic energy; and—no less important—the United Nations Economic and Social Council will have to be established for the purpose of ensuring that all the peoples of the world shall have a reasonable chance of living a good life. By removing the economic and social causes of war this Council will, it is hoped, be an able and effective complement to the Security Council and may, in time, render the latter's military machinery unnecessary.

The United Nations Educational, Scientific and Cultural Council may be said to have come into existence on 16th November, 1945, when the representatives of forty-four members of the United Nations signed its Constitution at the Headquarters of the Institution of Civil Engineers, in London. Its first meeting will probably take place in May or June this year. As one of the bodies created to assist the Economic and Social Council in the performance of its statutory functions, this ancillary council will be able to play an important part in furthering the aims of the United Nations. Its declared purpose is "to advance the objectives of international peace and of the common welfare of mankind, for which the United Nations Organization was established and which its Charter proclaims." "Since wars begin in the minds of men," says the preamble to its Constitution, "it is in the minds of men that the defences of peace must be constructed." And its main purpose will be to remove from among the peoples of the world that suspicion and distrust which, born of ignorance of each other's ways and thoughts and lives, are a common cause of

Agreements at Moscow, Christmas, 1945

Among the "glad tidings" brought to an expectant world during Christmas week was the most welcome news that the Conference of Foreign Ministers at Moscow had been, to quote *The Times*, "a striking success." If others are less jubilant about the result, suggesting that Russia has won hands down and given little or nothing in exchange for the concessions granted by Great Britain and the U.S.A., two considerations should be taken into account.

The first is that an international conference, whether of Heads of States or of Foreign Ministers, is not quite the same as chaffering in the bazaar or market-place. Bargaining is perfectly legitimate in trade between individuals or groups or even nations; and it is often resorted to by diplomatists in international affairs as a generally recognized and well-understood method of achieving desired results. But this should not be allowed to obscure the real issues at stake. The conference so happily concluded at Moscow on 26th December, 1945, was concerned solely with political matters affecting the future peace and security of the world. These matters are of the first importance and are not to be prejudiced by petty considerations of quid pro quo. What if Russia has gained more than she conceded so long as there is agreement?

That brings us to the second consideration: there is agreement. The publication of the Charter of the United Nations Organization and the spate of comment and criticism that followed it must have convinced everyone who is at all interested that world security in the future must depend ultimately upon agreement between the Great Powers. That is why the breakdown of the Foreign Ministers' Conference in London on 2nd October, 1945, was so serious. Thus there is every reason to rejoice in the fact that the "Big Three" have reached agreement on the many important points discussed at Moscow.

One other consideration may be fitly mentioned here. It has been suggested that Great Britain, while "still just strong enough to hang on permanently to the exclusive innermost circle of the biggest Powers, no longer seems to carry sufficient weight inside that circle to get her way, or even to make others meet her half-way, on any fundamental question of international controversy." This may be true; but it seems rather a large rabbit to produce out of the Moscow hat. Judging by recent events, there is some justification for saying that Great Britain now stands third in the order of Great Powers, if extent of influence on international affairs is the criterion. That being so, it is well to remember the circumstances which placed her there.

International influence depends upon wealth and war potential. During the war Great Britain spent her wealth in the Allied cause with both hands, unstintingly and ungrudgingly; and as a result is now poor—very poor compared with the United States. And her war potential, though still high, is less than that of Russia and the United States, even when that of the Dominions and India is taken into account. This disparity is not a thing to be ashamed of. We cannot help our numbers being small in proportion to those of

the United States and Russia; and the wealth we have lost we spent in the Allied cause, of which we were the sole champions for over a year. If we had given in in 1940 or 1941, Germany would have won. And as a result of our sacrifices in the common cause of freedom and democracy our influence now ranks third in international affairs. But giving up something is the essence of sacrifice; and there is infinite merit therein, so the cause be just.

Foreign Affairs

RUSSIA AND HER NEIGHBOURS

From the mystery and complexity of Russia's external politics a consistent policy is beginning to appear.

For many months we have watched with interest, and perhaps a little suspicion, the development of Russia's influence in Poland, in Eastern Germany, and in the Balkans; her apparent support of the autonomy movement in Persian Azerbaijan; her claims on Turkey's eastern provinces; her demands for revision of the Treaty of Montreux in respect of the passage of ships through the Dardanelles; and her insistence on having a voice in the control of Korea and Japan. And we have wondered what may be her next claim and what all this is going to lead to. We have not the space here to examine the justice of these claims; but we can, by taking them all together, deduce something of the motives which lie behind them and detect the plan of which they form coherent parts.

Russia, we may assume, is as interested in peace and security as any other nation—possibly a great deal more interested than some. She has suffered severely in many ways since 1914. Her losses in men and material resources in the First World War were enormous; the Revolution of 1917 involved a complete break-up of her political, social and economic life; the Treaty of Brest-Litovsk, though soon to become inoperative, was a smashing blow; immediately after that she suffered much through the invasion of Allied armies in north and south; her experiments in Communism, though valuable, were very costly; and her sufferings through the German invasion of 1941 and during the following years were unimaginable. And now, having come out of her deathstruggle victorious—with the help of her Allies she is faced with problems of national reconstruction unprecedented in magnitude. To enable her to solve these problems, to the solution of which she brings all the political and economic resources she can command together with the most laudable determination to succeed, she needs, above all things, many years of peace and security. She knows, as well as any, that another major war would set her back to an immeasurable extent, and might undo all that she has accomplished in social and industrial progress during the past twenty-eight years. So she seeks first of all security. And how can this be obtained?

Rightly or wrongly, Russia regards herself as surrounded, at least on three sides, by potential enemies, by nations who are suspicious of her Communist ideology, by nations who, to protect themselves from the alleged danger of Communism, might be tempted to retard her political and economic development by invasion. We say "rightly or wrongly" because we do not believe that any such threat to Russia's legitimate aspirations exists; but if Russia thinks it does that is a factor to be taken into account.

In pursuit of the quest for security Russia has adopted the policy of creating upon her western, southern and eastern frontiers a chain of spheres of influence which will cushion the shock of any attempt at aggression by those whom she fears, and prevent, or cause to be premature, the deployment of any hostile forces sent against her. And the best way to do this, in her view, appears to be to establish and support, in the countries adjacent to her frontiers, governments which will be friendly to her, and so to form buffer states between herself and her supposed enemies.

High Flight

War weaned these eager children in a breath, Put steel toys to their hands, with magic powers,

Gave them the skies to range—and counted hours.

And warned them "the last enemy is death." For them the engines' thunder on the breeze Is grander than the storm the baton cuts To faintest murmur, wind's song in the struts Sweeter than sirens' luring Ulysses.

As their great Argoes skim the quilted shires And the dark, racing shadows fade from

earth—
Exulting that lost eagles gave them birth,
Their hearts beat fast, aflame with rarer fires
Than we have known—in pure, translucent
space

They pause, maybe, abashed before God's face.

M. W. J.





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1939-1945

The drums like muffled anger and the trumpets can be heard!

The air is harsh with clangour as the nations are bestirred.

For the God of Battles heard us when we pledged our slender powers,

And He gave us strength to gird us, and the fruits of war are ours!

The mills of war have ground us, and have ground exceeding small,

Yet the victor's wreath has crowned us, and the crowning us is all;

The battlefield's still dusty and the fallen not yet cold,

But our throats ring loud and lusty with the story to be told!

From the valleys, from the highlands, from the sunlands and the north,

From the plains, the small lost islands, from the forests, came we forth;

We left the ripe corn waving when the far-off bugle pealed,

We left the heifer calving, and the new lamb in the field.

We bade adieu our dearest ones, and to the past, adieu—

The darkling hour before the guns was all the time we knew;

We had Righteous! for our banner, and On! for battle cry;

Our hearts were fired with honour, and we kept the fuel high.

Now the enemy is broken and his blood flows to the stream.

Our heroes lie, unwoken, their faces pale with dream—

They lie like trodden flowers with their faces to the east.

Wilt count their rarest hours, Lord, who reckoned them the least?

This noon must lose its glory, but their light shall never fade.

Not the bitter, burning story of the Mightiest Crusade—

Of the men who strove, united in their courage and their pride,

Whose longing was requited, because God was at their side!

M. W. J.

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THE ROYAL AIR FORCE QUARTERLY ESSAY COMPETITION, 1945

RESULT OF THE COMPETITION

SUBJECT No. 1

The Commonwealth and Empire Air Forces and Allied Air units at present serving with the Royal Air Force are fully integrated with the latter. They are organized, trained and operated on an almost identical basis. How far can this close integration in its present form be made a common object of our policy and contribute to the carrying out of projects for securing peace?

First Prize of £20 won by SERGEANT J. GLENN, R.A.F.
Second Prize of £10 won by FLYING OFFICER W. S. DUNDAS, R.A.F.

SUBJECT No. 2

Mobility is an essential element in the defence of the widespread commitments of the British Commonwealth of Nations and Empire, and for combined international enforcement action. Discuss the part that air forces might play in these spheres and the effect that the proposals might have on the existing responsibilities of the three Services.

First Prize of £20 won by GROUP CAPTAIN J. G. DAVIS, O.B.E., R.A.F.

Second Prize of £10 won by WING COMMANDER J. H. LAPSLEY, O.E.B., D.F.C., R.A.F.

SUBJECT No. 3

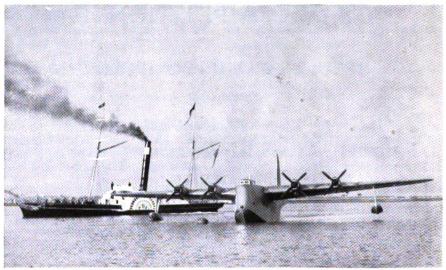
Discuss the effects that the rocket (including all rocket-propelled projectiles) and pilotless aircraft are likely to have on warfare generally and the extent to which they are likely to affect the defence of the British Commonwealth and Empire and the international air contingents envisaged above.

First Prize of £40 won by FLIGHT LIEUTENANT A. C. CLARKE, R.A.F., for the best essay in all three subjects.

Second Prize of £15 won by CORPORAL E. BURGESS, R.A.F.

Third Prize of £10 divided between SECTION OFFICER V. C. BROOKS, W.A.A.F., and L.A.C. LESLIE JOHN ELLIS, R.A.F.

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PRIZE ESSAY

Subject: The Rocket and the Future of Warfare

By Flight Lieutenant A. C. Clarke, R.A.F.V.R.

Cease! Drain not to its dregs the urn Of bitter prophecy. The world is weary of the past, Oh, might it die or rest at last!

-SHELLEY.

I.—Introduction

In the following essay an attempt has been made to trace to its logical conclusion the development of rockets and guided weapons. So many possibilities are opened up by these new techniques that the discussion has necessarily been restricted to very general terms. Such a treatment is indeed inevitable in an age when at any moment some new discovery may cause a complete technical revolution.

Inevitably the atomic bomb has loomed large in the discussion. The world has recognized instinctively the bond between the two subjects, and any portrayal of the future that was not dominated by the fact of atomic energy could well be likened to "Hamlet" without the Prince.

The rocket is now making its third and probably final appearance on the field of warfare. After its original employment by the Chinese in the thirteenth century it was used sporadically by various Western countries for over five hundred years without attaining any great importance. At the end of the eighteenth century it reappeared, somewhat surprisingly, in India, where Tippoo Sahib employed it against the British with considerable effect. Inspired—or provoked—by this example, Sir William Congreve developed the war rocket in this country until it became a serious rival to the smooth-bore guns of the day, and for a while every army in Europe had a corps of rocket artillery.

With the development of rifled artillery the rocket was soon completely eclipsed and for nearly a hundred years it was used only for signalling, life-saving and a few other specialized applications. It played very little part in the 1914 war and its spectacular return in the early 1940's has been due to the mastery of new engineering techniques and a greater appreciation of its potentialities. Even ten years ago few believed that the rocket would ever again play any major part in warfare, yet to-day it is challenging both artillery and aircraft and promises to be a decisive

weapon in any future war.

The rocket has so many applications that their classification is a matter of some difficulty, but the scheme adopted in Table I will be used throughout this essay. Under two of the main headings a sub-division is made into "Piloted" and "Guided" rockets, and at this point it may be as well to consider the position of pilotless aircraft generally.

The only P.A.Cs. used in this war have been flying bombs of various kinds, culminating in the famous V1. It seems likely that such machines will be used for (a) delivering explosives at a distant spot; (b) reconnaissance; and (c) destruction of enemy aircraft by collision or the launching of short-range projectiles. At the end of the war the Germans had in use or advanced development rockets carrying out all these functions, and any P.A.Cs. produced in the future would almost certainly be jet- or rocket-propelled. Thus the distinction between pilotless aircraft and rockets is likely to disappear, and accordingly no separate analysis will be made, although the subject of pilotless fighters will be touched upon in Section VII.

II.—FUNDAMENTALS OF ROCKET PROPULSION

The two dominant characteristics of the rocket are its enormous rate of power generation (a thousand or more times as great as that of a conventional engine of similar size) and its independence of any external medium for fuel, support or thrust. The first property enables it to achieve very high speeds and accelerations; the second permits it to travel in the rarefied air of the upper atmosphere, or in no air at all. Also as a result of the second property the rocket has no recoil and this gives it an important and in some cases overwhelming advantage over ordinary artillery.

The performance of a rocket depends upon certain technical considerations which will now be briefly outlined. The most important of these is the jet velocity, which in turn depends upon the type of fuel used and the efficiency of the motor. For the most powerful chemical fuels this velocity has a theoretical maximum of about 12,000 miles an hour. V2, which represents an early stage in rocket development (comparable, according to its designer, with that of the aeroplane at the close of the last war) had a jet velocity of 4,700 miles an hour.

Given a rocket motor with a certain performance, there are two ways in which it can be used. It may be employed to drive a projectile or aircraft at a certain velocity which is then maintained as long as the fuel supply lasts—usually a matter of seconds or at most a very few minutes. Air resistance prevents the machine from reaching more than a fraction of its theoretical speed, and the flight or trajectory ends soon after the failure of the fuel supply. Consequently this is a shortrange, low-altitude application of the rocket in which the maximum speeds attained are usually less than the velocity of sound.

The second case is fundamentally different and so far has had only one representative, the long-range rocket A4 (V2). Here the motor is used to impart the greatest possible velocity to a machine which for most of its journey is travelling as a free projectile, at such a height that air resistance is almost negligible. In this case alone is the rocket being used efficiently: the "atmospheric" applications are all extremely wasteful of fuel and are only justified by high performances which can be obtained in no other way. A good example of

this is the Me.163. In vacuum, where its motor could still operate, though of course the control surfaces would be useless, this machine would attain a speed of 2,700 miles an hour when it had burnt all its fuel. In actual practice, once it has reached about 600 miles an hour all the remaining fuel is used to overcome drag.

When air resistance is neglected, it is not difficult to design a rocket travelling at up to twice the velocity of its exhaust—in other words, at about 10,000 miles an hour in the case of present fuels and motors. Greater speeds can in theory be obained by increasing the fuel load, but there is obviously a limit to the amount of fuel a rocket of a given size can carry, even if the whole of the payload is sacrificed. A rocket capable of travelling at three times the velocity of its jet would have to consist of 95 per cent. fuel by weight—hardly a practical proposition, to say the least

These figures, however, give only part of the

TABLE I

CLASS		PROTOTYPE	ULTIMATE DEVELOPMENT			
A. SHORT RANGE. (1) Ártillery (2) Anti-tank (3) Airborne Rockets (4) Anti-aircraft (5) Rocket Boosters		Katushka, etc. Bazooka, etc. R/Ps. Z-guns JATOs.	Little change if still required. Radar-controlled launching turrets. Proximity fuzing. None; superseded by B.2. Little change.			
B. MEDIUM RANGE. PILOTED (1) Interceptor Fighter		Me. 163, Natter	Eventually superseded by B.2.			
GUIDED (2) Anti-aircraft		Wasserfall, Rheintochter, X.4, etc.	Radar-controlled homing rockets capable of werhigh accelerations, fitted with anti-jammers proximity fuzes, I.F.F. Designed to attack bombers and long-range rockets. Ground or air launched.			
C. LONG RANGE. GUIDED (1) Rocket Bomb		A.4. A.9. +A.10. (Two-step transatlantic rocket)	 Step-rocket of world range with chemical fuels. Speeds up to circular velocity (5 m.p.s.) Atomic warhead. Atomically-driven rocket travelling on powered trajectories at speeds up to 1 per cent. of velocity of light. 			
PILOTED (2) Reconnaissance (3) Bomber		DFS. 228	Television-carrying winged projectile. Later super- seded by guided version. Winged rocketship with speeds up to circular velocity. Used for launching rocket bombs.			
D. INFINITE RANGE. Interplanetary Rocket		_	"Spaceship." Evolved from C.3.			

story, for in addition to the loss due to air resistance a rocket has to expend fuel to support itself against gravity. This fuel could otherwise have been used to increase the machine's final velocity, and when these two losses are taken into account the A4 rocket has a "velocity budget" something like that below:

			m.p.h.
Air resistance loss	•••		1,000
Gravitational loss			1,100
Actual velocity	•••	•••	3,400

Theoretical velocity ... 5,500

Very long-range rockets would derive considerable advantage from mountain-top launches, since the air density is approximately halved at an altitude of four miles. The gain would be two-fold, for not only would air resistance be lessened but higher accelerations would be possible with a consequent reduction of gravitational loss. This point has strategic implications which will be mentioned later.

The range achieved by a rocket depends on its velocity when the fuel is burnt, for after that point it behaves as a normal projectile. A rocket which attained a speed of five miles a second (18,000) miles an hour) would have infinite range, since it would never return to the earth: such high speeds are, however, unnecessary, for, as Perring has pointed out,1 the range of a rocket can be greatly increased by the use of wings which come into play at the end of the free trajectory and enable the machine to enter a high-speed glide. The German A9 rocket had an 800-mile trajectory, after which it entered its glide at 8,000 miles an hour and so achieved a total range of 3,000 miles. Speeds of about four miles a second (14,000 miles an hour) would suffice for the greatest possible terrestrial ranges, and such speeds can be attained by "step-rockets" launched if necessary from high altitudes.

Having sketched in the technical background, we can now consider in detail the various applications of the rocket to warfare, in the order laid down in Table I.

III.—SHORT-RANGE ROCKETS

Rockets of this class have played a considerable part in the late war, particularly when used by aircraft for ship or ground attack. They have the great advantage of producing no recoil and so requiring only very light launching equipment. It is thus possible to concentrate very large numbers of projectors in a single place and so lay down short-range barrages of an intensity impossible by other means. Batteries of this type ("Katushka") were used by the Russians at

Stalingrad and mobile installations were employed later in the war for saturation bombardment preceding attacks or landings. For this application the short range and inaccuracy of the weapon do not matter, and if barrages are ever again used in warfare they are more likely to be provided by rockets than by other forms of artillery.

The rocket's absence of recoil has made it possible to design weapons of great fire power which can be operated by a very small crew or even by a single man. The "bazooka" anti-tank gun is the best example of this and may well mark the beginning of the end of tank warfare. A few infantrymen can now destroy the largest tank and it must be remembered that whereas the bazooka is only at the beginning of its development the amount of armour a tank can carry appears to be nearing its limit.

The rocket mine would seem to be a particularly effective anti-tank weapon, now made possible by the invention of "zero length" launchers. It would consist of a short launching rack buried vertically in the ground and, although it would not be as easy to install as a normal mine, it would be a great deal more effective against armoured vehicles.

The airborne rocket has already had a revolutionary effect on aircraft fire power and the process will continue. The largest gun (75-mm.) so far installed in an aircraft weighed 760 lb. and fired a 15-lb. shell containing only 1.5 lb. of explosive. These 760 lb. could have been replaced by twelve 60-lb. rockets of far greater destructive power, and when they had been discharged the aircraft's performance would not have been reduced by the dead weight of the gun. It has been stated that the fire power of a rocket-carrying Mosquito equals that of a 6-inch gun cruiser, and there is no limit to the size of projectile that can be launched from an aircraft, so long as it can be lifted off the ground. Aircraft fitted with such weapons could prevent all movement of armoured vehicles except those supported by air cover.

The development of air-to-air rockets appears to have lagged, although the Germans used them fairly effectively against American bomber formations. These weapons will come into prominence as engagements are opened at greater ranges and a possible line of development is the heavily armed "destroyer" fitted with rocket-launching turrets. The rockets would be aimed by radar and detonated by proximity fuses when they approached their targets. The larger projectiles might even be guided, either from the launching plane or from the ground.

Such "flying destroyers," if indeed they ever appear, are likely to represent a transitional stage

in warfare and will be rapidly superseded by the weapons discussed in the next section.

Before leaving the subject of short-range rockets mention should be made of assisted take-off units ("Jato's"), which have been extensively used during the war. These units permit a considerable increase in take-off weight and hence performance, and they can also be used to reduce the length of runway an aircraft needs to become airborne. Both these applications are of great practical importance and rocket-assisted take-off may become standard practice for large aircraft.

IV.—MEDIUM-RANGE ROCKETS

We now come to a class of machine which was beginning to appear at the end of the war and promises to revolutionize air fighting as we know it to-day. This is the medium-range rocket interceptor, of which both piloted and guided versions were under intensive development by the Germans at the end of hostilities in Europe.

The piloted machines will be considered first: one, the Me.163, actually became operational, and a second, the "Natter," was undergoing flight tests when the war ended. Both were manned rockets of very short endurance (about five minutes under full power), but with phenomenal rates of climb. The Me.163 could reach 40,000 feet in three minutes, while the Natter could do so in little over a minute.

There is no doubt that such machines will be developed intensively in the future and they may be expected completely to supersede the conventional interceptor fighter. Their high rate of climb would enable them to remain on the ground until the attacking bombers were only a few miles away. They would then go almost vertically into action, break off the engagement and return to earth.

Such machines, themselves launching rocket projectiles into the bomber streams, present a very considerable problem to the attacker. They could be countered only by heavy barrages from "destroyers" of the type envisaged in the preceding section, or by the use of such enormous speeds that interception was impossible. This in turn means the superseding of the bomber by the longrange rocket, and at this stage the human pilot begins to disappear from the picture.

The human body can withstand only limited accelerations, can respond to only a few stimuli at a time, and has comparatively slow reactions. The speed of attack is steadily increasing and the 3,400 miles an hour of A4 is merely the beginning. Against such speeds men can never hope to fight. Skill and courage and resolution—in the end all are of no avail, for there comes at last a time when only machines can fight machines.

At the close of the war the Germans were working desperately on a large number of guided rockets, such as "Wasserfall," "Schmetterling' and "Rheintochter." Some of these had been tested and claims of one contact in four had been made with experimental models. These missiles were to be controlled from the ground by radio and directed into the bomber streams, where they would home on their targets by radar or infra-red detectors. They would be capable of very high speeds—up to the velocity of sound—and when they are perfected it is difficult to see how the conventional bomber can hope to ward off such attacks. No doubt elaborate counter-measures would be tried, such as those employed in the radar war, but it is impossible to jam the whole radio spectrum. Automatically homing rockets might be deceived for a while, but there would be no effective defence against a ground-controlled projectile carrying A.I. and television and homing on the hundreds of kilowatts of heat thrown out by the bombers' engines. Such machines have already been developed and do not represent any great advance on existing technique.

These weapons mark the end of the man-carrying fighter—but not necessarily the end of the fighter pilot, who represents a complex of skills difficult to replace by machinery. There have already been several examples of missions largely controlled from the ground (e.g., oboe bombing, radar-controlled fighter sweeps) and the remotely controlled fighter, operated by a pilot many miles away, is a logical development to which we will return later.

Guided missiles are peculiarly adapted to naval operations, and for defensive purposes may well replace fighter aircraft at an early date. Large and vulnerable carriers will no longer be required purely to provide fighter cover, and the necessity of getting all aircraft safely down after an action will disappear, thus giving the fleet much greater freedom of action. Guided rockets could also to a large extent replace heavy guns for long-range engagements, with a consequent saving of weight of many thousands of tons in the case of a capital ship.

The guided rocket appears to be the only conceivable defence against the long-range rocket bomb, and this possibility will be discussed in Section V.

V.—LONG-RANGE ROCKETS

We saw in Section II that by increasing its speed sufficiently a rocket can be given even antipodal ranges, although at the expense of very small payloads. So far, the only long-range rocket has been A4, which had a maximum speed of 3,400 miles an hour and a range of 220 miles. The Germans had planned to increase that range o 3,000 miles by giving A4 wings and launching it from a much larger "booster" rocket (A10) which would have weighed about 85 tons. This step-rocket principle is very important and is one way of circumventing the velocity-payload aw

There is at present no defence against such projectiles once they have been fired, and their aunching sites are much less vulnerable than airfields to enemy attack. Although no detailed analyses of costs have yet been made, it appears that with conventional explosives rockets may be more economical than bombers for short ranges (say up to 400 miles). Cleaver² has pointed out the enormous saving in man power required for a rocket offensive as compared with heavy bomber operations, and rockets can, of course, be mass-produced extremely cheaply.

With present techniques it would require a rocket weighing about 100 tons to deliver a payload of one ton at a distance of 3,000 miles, about 70 per cent. of this weight being fuel. As atomic bombs weigh only a few hundred pounds and can never be much larger—though they will be far more efficient—it seems impossible to make any convincing case for the very heavy bomber.

The main objection to the rocket as a longrange weapon is its inaccuracy, but that is a defect which will certainly be overcome in time by the use of target-locating devices, radio lattices or television. It would be virtually impossible to jam a rocket controlled by a locked microwave beam from a high-altitude relay aircraft several hundred miles away, particularly as the radio control might only be required for a very few seconds when the projectile was nearing its target. It will also be possible to develop entirely self-contained controls similar to those used in the later A4's fired against London. They would comprise course integrators which could be set for any required destination and could not be affected by any external means. Once it had been launched only actual collision could deflect such a projectile from its target.

Against such weapons no complete defence would be possible. The only defence of any kind would be the guided rocket, and one can visualize the development of small machines capable of accelerations of 100 g. or more and homing on radiation, radar or even local gravity fields. They would be equipped with various types of I.F.F. to prevent them attacking each other. The possibilities here are endless: one might suggest, for example, the injection of suitable metals into the blast coupled with spectrum analyzers for interrogation.

However, even these machines would have little chance of intercepting, in a matter of seconds, projectiles travelling at 3,000 or more miles an hour.

As many have pointed out, the rocket is the ideal means of delivering atomic explosives and may soon prove the only method that can be used without the destruction of the attacker. A second important advantage, not so far emphasized, is that the enormous impact velocity of the rocket greatly simplifies the detonation problem if a ground-burst is required. The sub-critical masses have only to be placed on the axial line and they will be united at a speed which will prevent premature detonation and make unnecessary the complicated "gun" arrangements in the present atomic bombs.

Should it become possible to build atomically propelled rockets with motors of no more than the efficiency of the Hiroshima bomb (about 0.1 per cent.), the resulting jet velocities would be many millions of miles an hour, and the theoretical limit is the velocity of light itself. Although, of course, such speeds would be out of the question inside the atmosphere, it would be relatively easy to design rockets flying under continuous thrust at very high accelerations along constantly "randomed" paths. The interception of such machines by any material projectile would be virtually impossible, since even if they could be detected their destinations could not be foreseen until it was too late.

The Germans had one variety of long-range piloted rocket actually constructed at the end of the war, but this type of machine appears to have few military advantages for a number of reasons—not the least of them being the difficulty of providing for the safe return of the crew. Such machines might be valuable for reconnaissance, but even here they would ultimately be superseded by the guided rocket carrying television equipment.

The true "rocket bomber" (i.e., a manned rocket delivering explosive loads and capable of returning to its base) appears to have no advantages over the long-range guided rocket, and suffers from serious drawbacks, particularly vulnerability and low performance, since it has to carry a much greater weight of fuel as well as the equipment needed by the crew. However, General Arnold, in a report to the United States Secretary for War, has suggested that such machines would be required to launch rockets from unexpected quarters if the defence against long-range projectiles became too effective. These machines would be true "spaceships," travelling in trajectories outside the atmosphere.

This argument does not seem to be valid, since

guided rockets could be designed to follow courses at least as tortuous as those of manned machines, and at much greater speeds.

It is interesting to note that such machines could not employ bombs in the ordinary sense of the word, since any part of the load would share the ship's orbital motion and so be incapable of falling back to the earth.

VI.—INFINITE RANGE

A rocket which attains a speed of five miles a second above the atmosphere would never return to earth, but would continue to circle it for ever in an astronomical orbit. At a somewhat higher speed (seven miles a second) the rocket would escape from the earth's gravitational field completely and recede into space.

While chemical fuels are employed these velocities can only be achieved by "step-rockets" of very small payload, and such machines are likely to be of scientific value only. The advent of the atomic drive would, however, change the picture completely, for if conversion efficiencies of 0.1 per cent. were achieved, fuel loads of only a few per cent. would be ample for journeys to the nearer planets. It is not intended to more than mention these spectacular possibilities here, but they will be an immediate outcome of any harnessing of atomic power to rocket propulsion. When that time comes—and it may be only a few years away-vistas are opened before which the imagination falters. The least of the achievements we may expect to see is the establishment of stations in closed orbits at heights of a thousand miles or more, circling the world in periods of a few hours like artificial moons. The Germans were indeed planning such stations, and they present an attractive solution to the problem of world surveillance and control.

These latter suggestions may appear to many to be so fantastic as to be unworthy of serious consideration. But they are the logically inevitable outcome of one aspect of atomic energy, and as such cannot be ignored in any discussion striving for completeness.

VII.—THE SHAPE OF FUTURE WARS

We have now completed our detailed survey of the rocket's applications to warfare and can step back to take the broader view. One's first reaction to the new orders of magnitude presented by the combination of the rocket and atomic power is one of incredulity, but the technological nightmare which any future war will inevitably bring cannot be dispelled by closing one's eyes. All the weapons we have described can be built and will be if they are required. Most, indeed, already exist at this moment in prototype form. We may well be thankful to the Germans—little though they deserve our gratitude—for showing so clearly what lies ahead for the world if war continues. Their A4's, Natters and Wasserfalls point a lesson which the human race must learn now, for there may be no second chance. It will be a little late when the dust of all man's treasures incarnadines the sunsets of the world.

It has been said that no weapon is decisive, and that to every form of attack there is some defence. Whatever truth these statements may once have had, they belong to an age which has passed. In the guided rocket the Germans may have had the answer to the heavy bomber, but it came too late to prevent the destruction of their cities. During the interval between the adoption of a new weapon and its countering, the damage done to the material structure of civilization grows steadily greater, and there must come a time at last when breakdown occurs. The present state of Germany shows how nearly that point had been reached even with the weapons of the pre-atomic age.

No instrument of war has ever been conceived that lends itself so perfectly as the rocket to treacherous, unheralded and possibly overwhelming attack. There is a tendency to imagine that the very extent of their devastation would deter an aggressor from using the most powerful weapons of all. So pathetic a belief denies the facts of history, for ruthless men will use every means of warfare that comes to hand so long as it promises military advantage. However, it by no means follows that the new weapons need rely on annihilation to produce decisive results. The combination of rocket and atomic explosive raises the possibility of an entirely new type of warfare—radiation war.

It has been revealed that the temperature of an atomic bomb is of the order of several million degrees. All reports have emphasized the intolerable brilliance of the explosion, but it is seldom realized that only an infinitesimal fraction of the radiation lies in the visible spectrum at all. By far the greater part of the energy radiated lies around a peak nearly ten octaves higher, and the total rate of dissipation is about a million million times as great as that from an equal area of the sun's surface. In other words, the bomb acts as an X-ray generator of unimaginable power.

Many of the casualties at Hiroshima were due to radiation alone, and many who were not killed outright were permanently blinded. If bombs are developed for their actinic output rather than their explosive power, and detonated perhaps ten miles above the ground, they could interdict enormous areas. No one would dare to venture into the open if at any moment of the night or

day they might be struck down by a searing blast of radiation. Above all, crops could be blasted with such a weapon and all agricultural processes brought to a standstill. This alone would be enough to decide the outcome of a war.

It is perhaps here, rather than in its more commonly discussed uses, that the long-range rocket presents the most terrifying possibilities. If such a thing can ever exist, here would seem to be the ultimate weapon. It need have no great accuracy, and even if it were intercepted the resulting explosion would be none the less effective. A rocket every few hours would inhibit outdoor life or movement over perhaps thousands of square miles.

Such attacks might in time assume even more vicious forms. The rockets might be detonated nearer to the ground to induce artificial radio-activity which would compel the evacuation of the areas affected. Neutron and gamma-ray warheads might be developed against which only great thicknesses of rock could provide protection. And most terrible of all would be the threat—even if it were no more than that—of X-ray mutation. This might well daunt a race which would fight to the death against ordinary weapons.

To-day our reaction to such ideas is one of horrified disbelief, but horror is a singularly ineffective safeguard. The repugnance men once felt for flame-throwers and gas warfare did not prevent or even notably retard their adoption. Total war is bounded only by the limits of man's material powers, and those limits are swiftly receding towards infinity.

What part armed forces as we know them to-day will play in any major war between great powers will depend on how far the technological revolution has advanced. The statement that armies and navies are obsolete is certainly not true at the present day nor is it likely to be for many years to come. Countries may be defeated by long-range weapons, but they must then be occupied even if there is no land fighting. The invasion of Japan by unsupported newspaper correspondents, to quote Seversky, shows that this stage is perhaps already here.

The great capital ship, the protection of which has become such an increasing burden, has had its demise predicted so often that any further prophecies of doom are apt to be discounted. The carrier-borne fighter has provided the fleet with air cover, and guided missiles may give warships still more effective protection against aircraft. But the long-range rocket will be able to seek out moving targets at least as readily as fixed ones, for no radar camouflage can conceal a battle fleet steaming across the open sea. It is

now possible, in a fraction of a microsecond, to liberate in a single spot enough energy to lift a million-ton fleet vertically a dozen miles.* What effect such forces will have when released beneath the ocean has yet to be seen, but they must surely spell the end of any relatively compact formations of heavy ships.

Navies will be needed for the transfer of supplies in any foreseeable future, but the fear of radar reconnaissance followed by sudden annihilation may force them underseas. The invention of the Walter engine has made this technically possible and any surface craft may be small, high-speed units powered by similar motors. The superseding of heavy guns by precision guided rockets would indeed make large warships unnecessary, since vessels of all sizes but the very smallest could have equal fire power.

An important naval development will probably be the mobile rocket launcher, almost certainly a submersible. Its purpose would be to approach an enemy country and fire long-range rockets at selected targets, perhaps along trajectories that would make the victim suspect some entirely innocent neighbour. Such a scheme would have an irresistible attraction to certain types of mind: the treachery required involves no more than a straight-line extrapolation through Pearl Harbour.

The effect of the new weapons on field armies is more difficult to analyze. Any nation fearing invasion would use its long-range weapons to the uttermost against approaching armies, knowing that the opportunity would pass when the battle had been joined. It is difficult to see how any assault could be launched in the face of weapons that have already destroyed a hundred thousand lives in an instant of time, and it seems more than likely that the armies would not in fact move forward until the issue had been decided.

Armies will, of course, still be required for many types of fighting. No one imagines that long-range rockets would have assisted greatly in the Burma campaign. But it must not be forgotten that the very existence of the new weapons makes improbable such campaigns as the long struggle for air bases witnessed in the Pacific. Much of the bloody "island-hopping" of the Eastern War would have been unnecessary had the Allies possessed the means of delivering bomb loads accurately at ranges of three thousand miles.

The status of air forces has already been touched upon in earlier sections. For the near

^{*}The output of the Hiroshima bomb was of the order of ten million mile-tons.

future we can visualize the development of small, high-speed forces for specialized precision bombing, but for the heavy bomber there seems no future at all. Not only will it be superseded by more effective methods of attack, but the defence

against it appears to be in sight.

Troop and equipment carriers will certainly be needed, perhaps on the largest scale, but they could only be used in areas where the danger from guided missiles was small, since they would be even more vulnerable than bombers. Once they had landed their material it would at once come under bombardment: probably these forces would be used to move armies forward when it was clear that the initial long-range attack had been successful.

The fighter, as a defensive weapon, will give way to the guided rocket in the relatively near future. For long-range offence it may play a considerable part for many years, until automatic and remote controls have reached a very high degree of perfection. But ultimately even here it will be superseded, for there are no limits to what may be done by machines, whereas there are very definite limits to men's physical powers—in particular their ability to withstand high accelerations. There is also a psychological factor of some importance to be considered in this case. Menat least normal men—will not risk their lives on dangerous missions when they know that the same operation can be carried out by controllers sitting in safety before television screens.

Combat between remotely controlled machines is a possibility but not a very likely one, for such aircraft would rely on their speed to avoid situations where they had to fight. The problem of designing purely automatic—as opposed to remotely controlled—fighters capable of more than holding their own against piloted machines is one of extreme difficulty but great technical interest. With any automatic equipment there comes a stage when further complexity defeats its own end, but often by the time this point is reached the designer is unable or unwilling to stop. This tendency was noticeable in certain aspects of Allied radar, and was still more prominent in German V-weapon research. Therefore it should not be assumed that a device will never be developed simply because it is excessively complex or of little military value.

All possible combat manœuvres can be analyzed and recorded by suitable coding in machines of the punched-card type. It is conceivable that "battle integrators" may be constructed along these lines, capable of making operational decisions in a matter of milliseconds according to changing combat conditions. Recent advances in mathematical logic and the calculus of state-

ment, coupled with the rise of operational research, suggest the development of calculators capable of solving both tactical and strategic problems. These machines might be used in conjunction with automatic and guided weapons to wage an altogether new type of warfare which would be too swift and complex for detailed human control. This prospect—the apotheosis of mechanized war—is perhaps as far as imagination dare go at the present day.

VIII.—THE PROBLEM OF DEFENCE

The increasing disparity between offence and defence has become steadily more apparent in the course of this analysis. It cannot be too strongly emphasized that ultimately, as has been stated in the Washington Declaration, effective defence will be impossible against the weapons that man's expanding knowledge will put into his hands. The human race will shortly possess the power to interdict surface life over the greater part of the globe and, to quote the Smyth Report on Atomic Energy, civilization may soon have the means to commit suicide at will. The problem that now confronts us is not one of defence but of survival.

It is sometimes suggested that a war with long-range weapons might result in a stalemate when the contestants had retreated underground beyond the reach of each other's arms. Such a move would appear to be the only answer to the threat of atomic bombs, but it may be doubted whether a highly industrialized civilization could live permanently underground. The prospect is not, to say the least of it, an attractive one, and the difficulty of food production would set a practical limit to the length of time such an existence was possible. This, apart from any other considerations, would make prolonged warfare with atomic weapons out of the question. Nor does it in fact follow that adequate protection could be obtained in this way. The penetrating power of a rocket falling from a hundred miles or more is enormous and would enable atomic warheads to be exploded at a considerable depth. Such "ground depth charges" could collapse or severely damage any cavity that could be built without an impossible amount of labour.

Once the location of an underground city or production centre had been discovered it would be doomed. Absolute secrecy would be impossible and sooner or later the approximate site would be found. This would be followed by low-altitude reconnaissance with geophysical surveying instruments which would locate the exact position of the cavity. Only in the heart of large mountains could complete safety be guaranteed



against the weapons which may be available in another decade.

The British Empire, with its great distances and vast areas of territory, is probably the least vulnerable target in the world. On the other hand, the British Isles themselves would be indefensible in the face of long-range attack with atomic weapons. If the defence of the Empire is to be considered in isolation, apart from any other security scheme, the removal to Canada of the Central Government and the Service Departments must be carried out as a permanent measure. It would be impossible to do this after a war had started, and there would certainly be insufficient prior warning to enable such a vast transfer of administration to be made.

Whether the units of the Empire could retain any degree of co-ordination under the impact of this type of warfare is open to doubt, but in such a matter detailed prediction is impossible. The more closely one examines the problem the more convinced one becomes that security, like peace, is indivisible and that even a political organism as large as the Commonwealth could not hope to survive by its own efforts. One returns again to the conclusion that the only defence against the weapons of the future is to prevent them ever being used. In other words, the problem is political and not military at all. A country's armed forces can no longer defend it; the most they can promise is the destruction of the attacker.

In such circumstances the statement that the United Nations Organization is the last hope of mankind is literally and terribly true. It is therefore necessary to consider in what way the rocket can be used as an instrument of world rather than regional security.

Now that the world possesses rockets and atomic bombs mankind has a tendency to discount the weapons of which it was so terrified a few years ago. Therefore even if there is no intention of using them except as a last resort, the World Security Council should for psychological reasons possess long-range atomic rockets. However, the weapons which it would use if force proved necessary would be the air contingents of its members, employing ordinary explosives and machines of the type that exist to-day. Behind these would be the threat, never materializing save in dire emergency, of the mightier forces against which there could be no defence.

Not more than twenty launching sites with interlocking circles of fire should be sufficient to give world coverage. The sites would be on mountains, for the reasons mentioned in Section II, and would be staffed by men drawn from every nation. It would be the aim to inculcate in these men a supra-national outlook. This is by no means impossible even to-day, as the International Red Cross has shown, and this viewpoint is becoming more widespread in spite of superficial appearances to the contrary. The fact that the personnel required would be largely scientific would assist the realization of this aim.

These launching sites would have to be supported by a research organization of such a calibre that no individual nation could hope to match it. This body might in time act as the nucleus around which the scientific service of the World State would form, perhaps many years in

advance of its political realization.

The necessity for these measures should be kept under continual review, for the world would never feel completely at ease while they existed. A heavily armed police force decreases rather than increases the citizen's sense of security—but. on the other hand, we must recognize that the world to-day resembles the lawless Middle West of the last century, in which an unarmed sheriff would have had little chance of enforcing order. When a world economic system is functioning smoothly, when all standards of living are approaching the same level, when no national armaments are left—then the launching sites could be dismantled.

Only along these or similar lines of international collaboration can security be found: any attempt by great powers to seek safety in their own strength will ultimately end in a disaster which may be measureless.

Upon us, the heirs to all the past and the trustees of a future which our folly can slay before its birth, lies a responsibility no other age has ever known. If we fail in our generation those who come after us may be too few to rebuild the world when the dust of the cities has descended and the radiation of the rocks has died away.

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PRIZE ESSAY

Subject: Continued integration of Commonwealth and Empire Air Forces and Allied Units as an object of future policy and a contribution to the maintenance of world peace

By SERGEANT J. GLENN, R.A.F.

PROBLEMS AND POSSIBILITIES

AN is not a social animal as the biologist understands the term. He is gregarious, perhaps, and likes the company of his kind; but has never learnt properly to regard himself as a unit, a part of some higher organism that is humanity as a whole.

As with man so with those chance associations of men we call nations. This is not a casual comparison. Whatever emerges in the interplay of nations must be deeply rooted in the make-up of the men who compose them, and the very real manifestations of nationalism, whether aggressiveness or the self-sufficiency policies of the isolationist, are the collective signs of individual characteristics. A man does not like to feel himself absolutely dependent on his fellows, and nations are equally loath to admit mutual indebtedness. Men are willing to organize themselves in groups only in the face of necessity or expediency, and do not allow their group activities to overrun their own domestic affairs. Nations, too, are willing to ally themselves for hope of gain or in response to a threat of danger; yet the ideal of every nation is a state of complete self-sufficiency.

Morally, this point of view may appear shallow, and certainly it could never form the basis of any form of world organization. Are we, though, justified in accepting much more as a background for the possible integration of national units, either on economic or military levels? It is better to err in under-estimating the forces on the side of international or group action than to build up hopes based on a too optimistic assessment.

Even when we are only considering the nations within the Commonwealth we should be wise not to ignore their now sturdily maintained individuality. The Statute of Westminster was much more than a law: it gave expression to sentiments that had been developing within the countries concerned since the days when they began to exist. We can recognize this purely nationalist feeling without in any way being insensitive to the sentiments that run counter to it leading towards Commonwealth unity. As the lady in Pinero's

"Thunderbolt" persists in informing us, there are two sides to every question.

In opening a discussion, then, on the possible integration of post-war defence plans, either generally or with reference to air forces, we must keep in mind the possible radical opposition to any schemes put forward, and try to realize exactly why the unity that has already been achieved—at least for the duration of the war—should have been possible.

As far as the air is concerned, the Commonwealth forces and the various Allied air units, on arrival, found already a model of close integration in the Royal Air Force itself. Unlike the Army, it has never developed exclusive regimental traditions; it has always thought of itself as a single body, and individual personnel have regarded themselves as interchangeable within its establishments. In such a homogeneous organization it would have been very difficult for any external unit to exist without integration with the main body. In any case, the circumstances in which the non-Empire Allied units joined forces with Britain, almost as refugees, left them little choice but to accept the existing structure.

Now that the war is over, the various nationals concerned are for the most part anxious to return to their own countries. Inevitably they will take with them not only some of the traditions but much of the actual administrative and general organization of the Service: this will be particularly true of the three Commonwealth nations Canada, Australia and New Zealand, who have served on equal terms with us in posts of responsibility and authority, and who have co-operated so closely in training programmes. Yet, for all this, the first general reaction to the cessation of hostilities will be the reverse of integration: Allied personnel will want to sort themselves out and return as quickly as possible to their own countries, and popular feeling in the countries themselves will express itself as a desire for independence and freedom from the stormy affairs of the outside world. This emotion is real enough, even if based, as it is, on a fallacious and dangerous attitude.

So the problem of a unified system of defence within the Commonwealth, like the far less hope-



ful problem of international co-operation generally, begins with a psychological barrier to be overcome. In the end the breaking down of this barrier may be the result of economic necessity rather than military expediency. The members of the Commonwealth may be forced by world trends into close co-operation economically, and an integrated defence plan will follow. Yet however much the urge for isolation is overcome by the need for co-operation, enough will remain to render the final schemes a compromise with the ideal. The exact balance of this compromise will be fluid, and influenced by world affairs generally. It might even be possible to devise a loose provisional scheme without obvious sacrifices of independent action, one acceptable to all members of the Commonwealth, one which could instantly be tightened if a state of emergency should arise. This interesting possibility will be discussed

Complete unity, in many cases, is not wholly desirable. Unity may mean strength; but often it means inflexibility. This is particularly true of large-scale warfare. The total campaign against Germany would certainly have been less effective if the Soviet forces had fought, together with Britain and the United States, under one Supreme Command, presenting the enemy with one adversary and one set of tactics instead of two. This point is too obvious to be laboured. Nevertheless, setting aside the particular conditions of the Second World War, the British Commonwealth and Empire is, on a global scale, not too unwieldy to nullify the advantages of a co-ordinated or even centralized scheme of defence. It is certainly the only large group within the United Nations that is likely to produce such a scheme. One can hope that our relations with the U.S.A. and the U.S.S.R. will remain cordial; but at the moment they are not tending to become more intimate. Any sort of federation is out of the question, and will probably remain so.

A discussion of international co-operation, however, is irrelevant to our subject: we are for the moment concerned with co-operation within the framework of the British Commonwealth of Nations, and concerned more particularly with military co-operation. Under the stress of war there is no doubt that, in the air forces at least, this co-operation has been absolute. The traditional unity of the Royal Air Force proved flexible enough to accommodate the Commonwealth forces from Canada, Australia and New Zealand; and these forces themselves were adaptable enough to fit in without difficulty or stress.

Yet the post-war set-up in the countries concerned will be rather different from that in which the close association began. At the beginning of the war the air power of the Empire was virtually concentrated in the Royal Air Force. The Royal Australian Air Force, for example, was almost a token force, whose front-line aircraft was the Avro Anson. Standing alone, the Commonwealth forces would have been negligible. Only by joining in with the R.A.F. could they have become effective. With the progress of hostilities the picture began to change. The Commonwealth became air-minded, under the double impact of the Empire Air Training Scheme and the need for aircraft factories centred other than in the British Isles. In Canada and in Australia the aircraft industry sprang up, and with it many ancillary activities such as radio production. This growth was not, of course, any faster than the corresponding development in Britain itself; but now the Commonwealth air forces are no longer insignificant. Developing almost homogeneously with the Royal Air Force, they have now strength enough to stand on their own feet to defend their own lands, and the realization that this is so must inevitably affect public opinion in the Dominions.

That the Royal Air Force is still the parent stem and the potential source of further development is undeniable, yet to the Dominion people at large—particularly to those with no particular concern in air matters—this relationship may threaten domination; and public opinion, however illogical, can never be ignored. Thus a prerequisite of co-operation in defence programmes. as in economic measures, is the forming of an active public opinion in its favour. The Commonwealth Governments must put the case to their people as compellingly as possible, stressing the equality of Britain and the Dominions, stressing above all that participation must be willing and voluntary. This will not be easy; there is too much suspicion already, even when we do not care to acknowledge it openly.

The steadily mounting list of contentions between the major Allied Powers—what the average Englishman sees as the intractability of the U.S.S.R. and the self-satisfaction of America—should surely provide the Dominion peoples with arguments in favour of their mutual co-operation to preserve a common heritage, a common ethical purpose that should be more significant than mere geographical distance or propinquity. The healthy and understandable independence desired by the nations of the Commonwealth should surely move of its own accord towards a staunch and free co-operation to keep alive the British ideals of life and government that they all share.

Yet to achieve this co-operation is it necessary for the Dominions to lose their individuality, or forfeit the prerogative of making their own decisions? Is the only solution to the problem of united defence a plenipotentiary military staff sitting in London, organizing and directing the Commonwealth forces? Would the Air Ministry have to become the one controlling factor in the air forces of the participant nations? If all this were so, then the chances of securing Dominion agreement by any scheme are indeed remote. Or, on the contrary, could liaison methods give the desired result? Could the Dominion air forces be left free to develop along their own lines, following the particular needs of their own countries, and yet remain at all times ready to fuse into a unified and formidable striking force, capable of instant mobilization whenever required?

If such a plan could be formulated, surely it would meet with general Dominion approval. It would fit neatly into the two co-existent sentiments: the obvious and now far from superficial feeling of national power and importance, and the underlying sense of unity under a common Crown, sharing a common civilization. The plan would dispense with a central command for normal peace-time activities, dispense even with a single pan-Empire defence plan to which the Commonwealth nations would be expected to subscribe. It would merely provide a common background to development, serving to keep the individual air forces sufficiently in touch with one another to enable instant joint action to be taken if called for. It would give the Dominion peoples a sense of possessing independent national air forces that are in no way subordinate to or dependent on the Royal Air Force. This is not suggesting that there is any present rancour on the part of the Dominions: only that the Dominion peoples will not be fully satisfied until their own forces are obviously and completely autonomous. until they feel that their countries can adopt any policies they please.

This particular point is so important that we must consider some of the freedoms for individual members a Commonwealth policy must allow. Firstly, the Dominions should not be bound to co-operate as a body with Great Britain or with any one member nation in settling a disturbance of local character which concerns Britain or that member only. Under general conditions of peace help in this direction simply would not be forthcoming. We have an historical basis for this statement. When Britain's relations with Turkey over the Dardanelles came to a head in 1922, and British troops were sent to the area, Canada flatly refused to send a contingent without a preliminary consultation of the Canadian Parliament; and Canada's decision certainly had the support of the other Dominions. Secondly, such a policy, if it is to be acceptable, must not interfere with any agreements which Commonwealth nations may make with foreign powers, pursuant to their own foreign policies. With Canada again as an example, it is obvious that her relationships with the U.S.A. are, in Canadian eyes, as important as her relationships with Britain. Her Joint Permanent Defence Board was set up with the U.S. Government in 1940, and is not likely to be repudiated in favour of a Joint Dominion Board.

It is sometimes difficult for the Englishman to realize that the Dominions do have widely varied interests, with quite different attitudes to foreign affairs, existing side by side with the Empire unity that the recent years of strain have done much to emphasize. This divergence is shown in all fields, economically and politically. An Empire Defence Plan, and particularly one which must fit into the wider schemes of the United Nations Charter, must take full account of it. The trend of world affairs, as we have already suggested, may possibly throw the Dominions more closely together; but it remains that necessity rather than choice will be the unifying agent.

The meeting of the Dominion Prime Ministers last year, and the deliberations of the British Commonwealth Relations Conference early this year (1945), show clearly both the friendship between the Empire Powers, and the impossibility of threshing out a true common policy apart from in the emergencies produced by war. A common defence policy, even if agreed upon, would of necessity have to be administered by voting members representing the powers, and would assuredly run on the rocks if voting ever went counter to the national or regional interests of one or more of the Dominions.

The Ottawa Conference was an attempt to produce a co-ordinated Imperial economic policy. and its results show yet another danger that our so far unformulated plans for integrating Commonwealth defence forces must avoid. The Conference itself, in spite of the current attempts to revive all that it stood for, was not a very successful affair: it produced sundry bi-lateral agreements and Empire Preference schemes, but no single agreed policy. Yet it was interpreted by foreign powers as an attempt to produce an economic bloc, and earned us the suspicion of the U.S.A. particularly. So it would be fatal if the suggested defence measures gave the world at large the impression of an attempted military bloc, an Empire Alliance which, in the eyes of foreign powers, would give each one of the Dominions the big advantage of a world-wide federation.

That is a final prerequisite of any scheme which may be suggested; and it is so essential to get these points home that we had better repeat them.

A Commonwealth Defence Plan must:

(a) Not of necessity draw all Dominions into any disturbance involving only one.

(b) Not interfere with individual foreign policies or the right of members to plan as they please.

(c) Not be dependent on unanimity of vote.

(d) Not give the impression that a military bloc is being formed.

Whatever suggestions the idealist may put forward, whatever may eventually emerge as a cooperative policy on the part of the United Nations, it must be accepted as a matter of hard fact that any present agreement between the Dominions can only come for measures which comply with the above four points. Such measures could not be based merely on the extent to which co-operation and unity of organization was achieved during the war. It would be a good thing for the world if this could be so; but to assume that it will be so is to ignore a host of difficulties that are already becoming apparent.

A PLAN FOR AIR DEFENCE OUTLINED

All the foregoing must be considered as the necessary approach to a Commonwealth policy of defence integration, and it will be seen that something much more than our war-time unity will be needed if future developments are to take place freely and without friction. Can we now suggest a plan which stands at least a chance of success, which would call for a minimum of centralized control yet have at all times a maximum capability of joint action without the inevitable clash of varying organizational systems?

Obviously, such a plan or set of plans cannot be called into being without joint action. There must be a preliminary agreement to initiate them, and an agreed syllabus of training and development. It is here that the war-time fusion into what was in effect a single air force will have been of the greatest assistance. Each of the countries will at least begin with a common organization and procedure, and each country will be able to regard it as its own. All that the plan need do is prevent a useless divergence as development proceeds, and a wasteful multiplication of research and experiment. And it must begin with a joint conference, a "Ways and Means "Commission.

The terms of reference of this Commission must be very carefully prepared. The Commission cannot and must not be a Defence Board on the Canada—U.S.A. model, undertaking a survey of the defence requirements of the Empire, making recommendations and proposals. Foreign powers would see in this a military bloc, and the Dominions would be suspicious of British domination, of plans influenced by Britain for the

defence of areas beyond individual Dominion interests. It must only discuss the possibility of letting Dominion air forces develop along the lines already set by the Royal Air Force, agree on means for keeping the various forces in touch with one another, suggest how the results of research and technical development could be made interavailable; keeping all the time in the background the idea of joint co-operative action, fully integrated under a central command, as a measure to be adopted only in the gravest emergency. One can reasonably assume that all these points will carry enough advantages with them to make them acceptable to the Dominions. The advantage to the Dominions, in fact, would certainly appear greater than to Britain, who will undoubtedly lead in research and development. On the administrative level, the Dominions are already so familiar with the organization of the Royal Air Force that they are unlikely to want to adopt any other.

The Dominions, then—we are thinking particularly of Canada, Australia and New Zealand—would probably readily agree to set up and administer air forces on a purely national basis, independent of Britain and one another, yet each modelled on the Royal Air Force, freely accepting its general and even detailed organization. We begin, in fact, by advocating a frankly nationalist set-up, making an instant appeal to the Dominion peoples, and do not propose to modify this set-up in any obvious external way.

How, then, can the Commonwealth air forces be kept in step with one another while each develops the equipment and tactics required by its own national circumstances? The first and most acceptable proposal would be the interchange of research facilities and development ideas. The advantage to Britain would be the continued cooperation of the Dominions: to them the whole imposing structure of British technology and science would be available. One must stress that interchange does not of necessity mean pooling. There would be no suggestion of a single Commonwealth Aircraft Establishment under a Joint Directorate. Each country, rather, would agree to set up and staff its own establishment; and each would agree to circulate confidential reports of its progress to other establishments on the understanding that each could follow lines opened up by the other. In addition to these "regional" establishments, each controlled by its corresponding Air Council, there could then be a central research station dealing with problems too big or too general for the Dominion stations to handle efficiently. This Central or Commonwealth Establishment should be outside the orbit of the air force of the country in which it would be set

up—presumably in Great Britain, where it would not be a branch of the Royal Aircraft Establishment. It could then be a clearing house for research within the Commonwealth, and the source of technical advice and inspiration, staffed by those whose interests are as far as may be technical and not political.

As a permanent institution, it would be one symbol at least of Commonwealth unity. Once accepted, the way would be open for other tokens of co-operation. The research establishments would have no direct connection with tactical developments, with intelligence, with training, or with administration generally. Could not these, too, be made the subject of an exchange of ideas and information? If each Dominion air force were to maintain a liaison staff, whose duty it was to pass on all the information on the subjects listed above as outside the field of the research establishments, then each country should feel that it was gaining at least as much as it gave. The Dominion liaison staffs would be able to function most effectively, of course, if there were a Central Liaison Staff, maintained independently of any one country, to act again as a clearing house for the sort of information we are considering. Its existence, if it were to function properly, would keep the Dominion forces sufficiently in step to let them march together without difficulty if ever it became expedient for them to do so. The Central Liaison Staff, as the Central Research Establishment, would have no controlling power or direct authority. Both would be the common servants of the Dominions.

If agreement in the hypothetical preliminary "Ways and Means" Commission could be reached so far, the next step is plain. With two centralized staffs we would set up a single Coordinating Committee through which these two could act together, a small group of Air Officers with technical advisers appointed from the Dominion personnel, who could keep research in step with the strategical requirements disclosed by the liaison staffs. Once again the word "co-ordinating" must be stressed as not implying control.

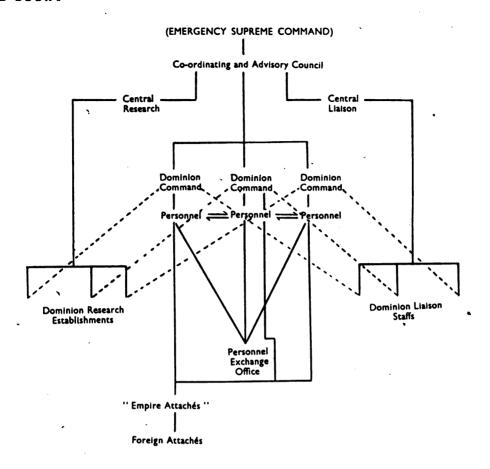
We are now beginning to build up a possible plan which could keep the Dominion air forces together without imposing in fact or in appearance any supra-national dictatorship, without bringing to the fore any of the many disadvantages of a federal union. The air forces would not be "integrated" with one another in any way; yet they could become so almost overnight if need be felt. Possible elaborations of these basic ideas are many; but the whole scheme should be kept as simple and flexible as possible. It could be suggested, for instance, that high strategy and advanced research form only part of the problem.

Forces which are to act together must be able to unite on the personnel level. It should be relatively easy to arrange "exchange parties" of all ranks between the British and Dominion air forces. These would not be considered as longterm overseas postings; but as relatively short say six-month—spells to gain experience in Dominion conditions of life and service. Considerable competition could be anticipated for the privilege of thus getting a stimulating and valuable tour abroad: it could well be made a prize for personal efficiency and would do much to make a Service career attractive. The exchanges would be as informal as possible; but their value is obvious if ever the circumstances arose in which the Commonwealth should once again have to function as a military unit. They could best be arranged through an exchange office.

Further developments of such a scheme could only be made after experiment, but these must avoid any suggestion of restriction, or of an alliance which mischief-makers could construe as a threat to international relations. It would, in fact, be as well to ask foreign powers to send permanent air attachés separately to the Commonwealth powers. Such a gesture of good will should greatly assist international understanding. It would be useful, too, if the actual Governments of the Dominions were to send attachés to one another to bring reports of activities direct, doing openly what otherwise the Co-ordinating Council might be accused of performing behind the scenes. Such Dominion attachés would have a status rather different from the formal position of their diplomatic counterparts. They would be accepted as a guarantee of mutual good faith, and in general would not be active personnel belonging to the air forces of their own nations. It would stress the non-political nature of the Co-ordinating Council if they were to have no say in appointing these attachés, and if they remained the only direct government representatives in touch with the air forces of other governments.

The foregoing outline of a Dominion plan contains nothing that might prove too much a source of contention: it leaves each participant nation with full initiative and full individual responsibility for its own defence, yet gives each the advantages of developments in the other. The possibility of a future war, at least on a worldwide scale, is fairly remote. It is, however, still to be reckoned with as a possibility, and the suggested plan could very readily be adapted to meet it, the whole structure being taken over by a single Supreme Command, appointed by agreement among the Dominions.

A diagram would make the suggested interrelationships more clear:



The Emergency Command as shown in the diagram would only exist during a state of actual or threatened world warfare, when it would include and supplant the normal Co-ordinating Council.

THE PROPOSED PLAN AND THE UNITED NATIONS

These proposals have been made without direct reference to the Charter of the United Nations. Obviously they must be scrutinized in the light of the international agreements reached at San Francisco. At the outset, it can be claimed that the plan would not clash with anything in the Charter, which expressly allows individual nations to make their own defence programmes, and allows them to unite into groups for defence purposes. A Joint Commonwealth Defence Board of the sort this essay has dismissed as both impracticable and politically undesirable would, in fact, be quite in order as far as the letter of the Charter is concerned. Would the plan as proposed, however, enable the Dominions to fulfil

their commitments under the World Security arrangements? The United Nations is not yet a going concern (1945), and what its requirements and activities will in practice prove to be is uncertain; but if we consider the relevant clauses of the Charter and imagine them in operation, we note that signatory nations will be required to keep air contingents ready for use against possible aggressors and peace-breakers as recommended by the Security Council. Such contingents can surely be imagined as integral with the various national air forces.

If more than one Dominion (since the Charter regards them all as separate sovereign states, which indeed they are) were requested by the Council to send contingents, the only effect of the suggested Commonwealth plan would be to ensure that these contingents at least would be able to carry out combined operations without inefficiency and misunderstanding. It is very easy to imagine almost insuperable difficulties arising out of attempts on the part of the World Security Council to enforce international discipline, with

the aid of several ill-assorted detachments garnered from the several Ruritanias which may happen, geographically, to be placed in a strategic position relative to the scene of operations.

The plan might even mean that the United Nations would come to rely more and more on the British Commonwealth to assist in keeping the peace, in the many minor disturbances which the Council will be called upon to smooth over. Ideally, it could mean a new lease of life for the Empire, not in any jingoist sense but as a group of nations eager to co-operate with one another without sacrifice of the rightly treasured national individuality. It could mean, too, a new sense of security and importance for the minor powers. Already the Statute of Westminster allows foreign powers to request membership of the Dominions. No country, so far, has availed herself of the opportunity (Iceland seems to be the only state that has even discussed the idea!), but there is no reason why powers should not be permitted to become members of this loose and nominal federation for defence.

Those Allied nations whose territories were occupied by Germany, and who came to England and so bravely fought beside the British and American forces, might well consider the matter. This is particularly true on the level at which our proposals have been made, that of air defence. We have already noted that during the war years the contingents of these powers accepted the whole structure and organization of the Royal Air Force, becoming part of it. It is inevitable that their post-war developments will reflect those years of close co-operation, and it would follow as a natural suggestion that this co-operative growth should continue. Even less closely associated countries—Egypt is one—have modelled their air forces very closely on the British pattern, and, provided the initiative comes from them, there is no real reason why their inclusion under the scheme should not be given every consideration. Nothing in the plan as outlined could exclude a foreign power, even one with relatively weak defences. The difficulties of language would be less noticeable than they were during the wartime operational integration in England.

If India were given full Dominion status she would, of course, be automatically invited to join

the scheme. It would be an excellent way of indicating to this sensitive nation that her equality with the other Commonwealth members was absolute.

SUMMARY

We have now discussed the background against which an integrated Commonwealth defence plan must be drawn up, have made outline proposals of a practicable nature, and have indicated how the plan might fit in with world affairs generally, with particular reference to the United Nations Charter. Without repeating arguments, it would be as well to summarize the various conclusions as briefly as possible. We decided that a single Joint Commonwealth Empire Defence Scheme under a central command is undesirable and would not prove acceptable to the Dominions. A workable scheme, however, would be a close liaison on technical, administrative and strategical matters between purely national air forces, enabling joint action under a Supreme Command to be taken if absolutely necessary. Such a plan would fit in well with the United Nations proposals yet to be carried into effect, and could without modification include nations other than the Dominions.

No more than a passing reference, of course. has been made to the many other aspects of international life on which Dominion policies could with advantage be brought into line with one another. We are interested primarily in air defence. It would be foolish, however, to hope that the proposals as set out could in fact become adopted if the Dominions fail to agree broadly on most aspects of economic, diplomatic or even domestic matters. The attitude taken throughout. however, that the Dominions are to be regarded as independent sovereign states must also be adopted as a basis for discussion on those other points. In England we are beginning to expect too much from the sentimental approach to Commonwealth matters. No one would deny the existence of that sentiment: but clear-cut diplomacy. frank discussion and full sovereign equality of states one with another can become the only satisfactory basis on which the British Commonwealth can continue to exist.

PRIZE ESSAY

Subject: The employment of Air Forces in Imperial Defence and combined international enforcement action

By GROUP CAPTAIN J. G. DAVIS, O.B.E., R.A.F.

I.—Introduction

1. Up to the last war the British Empire, which owes its foundation and continued existence to trade, depended mainly upon sea power for its security. Sea power was able to free the seas for our trade and cover the passage and communications of our warlike expeditions, whilst preventing the enemy from doing the same. At the same time it kept inviolate the heart of the

British Empire, the British Isles.

2. This sea power was itself dependent upon a strong merchant fleet, a powerful navy and a chain of strategic naval bases and refuelling stations in all parts of the world. On these bases our fleets or cruiser squadrons could pivot or concentrate—the "coherent dispersal about a strategic centre" of which Corbett speaks in "The Principles of Maritime Strategy." There is no sea or ocean across which our trade routes pass in which we do, or did, not possess naval bases. In the Mediterranean we hold, or have held, Gibraltar, Minorca, Sicily, Malta and Alexandria; in the Atlantic, Halifax, Freetown, Iceland, the Falkland Islands, the West Indies and the great bases of the British Isles themselves; in the Indian Ocean, Simonstown, Aden, Diego Suarez, Mombasa and Trincomalee; in the Pacific, Singapore, Hong Kong, Sydney, Auckland, Esquimault and the Pacific Islands. The range of our sea power was world wide. Wherever the centre of gravity shifted fleets could sail to look after our interests, as bases for their reception and maintenance were available in all quarters of the globe to increase their mobility.

3. One of the main duties of our armies in the past has been the securing of those naval bases and ports on which all else depended. The history of our imperial expansion has been that of the acquisition of key bases to cover the trade routes which our enterprise had opened up. Secure in the possession of these bases, we could concentrate for attack or defence as required, and support and move our armies and those of our allies without interference. Our possession of Minorca allowed us to blockade Toulon, and at the same time actively to support the Spaniards during the Peninsular War. The pages of Napier reveal repeatedly the omnipresence of sea power. Though Napoleon had 300,000 veterans in Spain he could

do nothing to prevent our nourishing the Spanish ulcer from the sea when and where it seemed good to us.

- 4. The war which has just ended, however, has shown that the old traditional system of imperial defence and attack will no longer suffice. Enemy air power, and the large-scale use of such specialized weapons as submarines, greatly weakened the potentialities of our sea power. In the early part of the war our ships could not operate unsupported within the effective range of enemy aircraft without incurring serious losses. The sinking of the cruisers Gloucester and Fiji, and numerous destroyers, accompanied by crippling damage to other vessels, off Crete in 1941 will serve as an example. In the same way many of our naval bases could not be used by our ships at the very time when they were most needed. Malta, Plymouth, Chatham and Portsmouth were all rendered virtually useless as major bases for a long period by the threat of air attack. Similarly, our Eastern Fleet was forced by air action to leave Cevlon for East Africa. It was not until strong air cover could be provided that our naval forces regained their freedom of action, and the necessary additional mobility provided by bases hitherto denied to them. The emergence of air power as the necessary partner of sea power was equally marked in the war against the U-boat. There is no doubt that our naval forces alone could not have dealt with the U-boat menace, and the operations of Coastal Command and other maritime air forces were vitally important.
- 5. Like our naval forces, our armies could not move by land or sea without air cover, and to their traditional task of securing ports they had to add that of seizing or making airfields. Wellington could not advance into Spain until his communications with the sea at Lisbon were assured. Montgomery has said that his advance in North Africa depended on securing fighter airfields within range of the projected route. The influence of air power gradually increased throughout the war until it was felt as the decisive factor in all phases of all operations.
- 6. It is reasonable to assume that the already predominant position of air forces as the decisive element in defence, or attack, will become still further marked with future progress. This trend

was already quite clear before the arrival of the atomic bomb. The development of nuclear fission as a super-explosive is unlikely to wrest pride of place from air power, even when pilotless projectiles of sufficient accuracy, range and selective power can be designed. The present method of inducing nuclear fission is not variable, as only with certain masses of plutonium does explosive disintegration take place. Obviously all possible targets do not require maximum effect, and where they do, at least at long ranges, the aeroplane is still the most efficient method of conveying the atomic bomb or projectile to its destination. It is assumed therefore that for the immediate future the aircraft, in one form or another, will hold its own.

7. It is the purpose of this paper to discuss how best air power can be used in the defence of the Empire, or in international police action. Maurice says, in "British Strategy" (writing in 1928): "Now the outstanding military fact as far as concerns the British Empire is that its potential resources are scattered in every quarter of the globe. Every invention which helps us to conquer time and space therefore tends to make easier not only the social and commercial union of the Empire but also the effective employment of its military power." This fact is demonstrably true of air power, and air power properly deployed and used should be of more assistance to us than to any other power, enabling us for the first time in our history to use our exterior lines to good advantage. We have seen how in the past Imperial Defence has depended on fleets and naval bases; it would seem that the process will continue to be the same in the future, only with air fleets and air bases gradually replacing their maritime counterparts.

II.—SECURITY OF THE BASE

8. In past major wars our sea power has defended the main base, the British Isles, and at the same time freed us to strike our enemies where we willed, or to succour our outlying possessions. In minor wars and uprisings the problem has been for outlying garrisons to hold out until they could be relieved. But both these types of wars had one thing in common—the necessity for us at first to conform to the enemy's action. The dispersed nature of the Empire made it necessary for us to scatter our forces in garrisons overseas. No major war has ever found us with our forces concentrated, and similarly, we have rarely had sufficient force at hand to deal promptly with local colonial or native wars, other than those on a very small scale. Our sea power up to 1939, and our sea and air power together in the last war, however, gave us a shield behind which our redispositions could be made whilst we stood on the defensive, until in due course we ourselves could seize the initiative. Hitherto this has been the pattern of the typical British war.

9. Before deciding how best our air forces can be employed in future, it will be well to examine the profound changes which have already come about in the fundamental background of the British war. In the preceding paragraphs it has been shown that our power to wage successful war in the past has depended on sea power, aided latterly by air power, and that that sea power itself depended on the possession of secure bases, all of which in turn depended upon the inviolability of the British Isles themselves. The two decisive battles of the last war, in the sense that by them was decided our power to continue the war long enough to ensure victory, were the Battle of Britain and the Battle of the Atlantic. On their issue hung the question as to whether the main arsenal, the main industrial centre, the main naval and air base, and the main recruiting centre of the British Empire could continue to discharge their functions. With all their wealth and size, the Dominions and Colonies could not have waged victorious war had Great Britain fallen. Their strength is potential, ours is actual, in man power, industry and armed might.

10. Under the conditions prevailing up to the appearance of the atomic bomb, we could still guarantee the security of the British Isles, that main base on which all else depended. I suggest that we are no longer in a position to do so. As far as can be seen, it is not possible to defend the British Isles against atomic attack, either by aircraft or rockets, though it may be possible to reduce the scale of attack. We have only to measure our own vulnerability per square mile, in terms of vital industries, bases, centres of population and ports, compared with that of potential enemies to realize that on a blow-for-blow exchange with atomic weapons we have lost any conceivable war as soon as it starts. All diplomatic, military, naval and air plans must depend on the realization of the above fundamental and inescapable fact. Therefore, before deciding on the deployment and use of our air forces in defence of the Empire, a policy of shifting the centre of gravity of the Empire itself must be started, as otherwise the most wise and far-sighted dispositions can be paralyzed by a blow at the heart.

11. It would appear that Imperial Defence must in future rest on two principles. The first is that the British Isles must cease to be the Empire's only major base, the loss of which would be fatal. The second is that any war with atomic weapons between great powers is lost by both sides, whoever wins it technically—if it ever begins.

12. We can assure the first by spreading our industry and man power throughout the wide spaces of the Empire, thereby calling in dispersal and distance to help us, as it does all the possible adversaries it is reasonable to consider. It will obviously be difficult to move industry and population by deliberate transfer. It will probably be easier to foster the growth of parallel major industries and trade in Canada, Australia, India and South Africa. Given such a growth as part of a deliberate policy, the centre of gravity of population would naturally begin to shift and could be fostered by emigration schemes. The present white population of the British Empire is about 70,000,000, of whom 50,000,000 are in the British Isles. A more reasonable distribution would be 15,000,000 each in the British Isles and Australia, 10,000,000 in South Africa, and 30,000,000 in Canada. The Canadian proportion could safely be increased still further in view of the large habitable area of the country. Each of these countries would then be a main base in itself, self-sufficient in all major industries and with its own thriving trade with the rest of the Empire and the world at large. Our diplomacy must continue the process thus begun of making the highly vulnerable British Isles an advanced base instead of the only main base. Close alliance, or preferably union, with the United States of America, coupled with the dispersal of military and industrial potential throughout the Empire, would render our position impregnable. It would remove what is now a powerful incentive to aggression against us, the fact that by blotting out the British Isles, a war against the Empire could be won at one blow without fear of comparable retaliation.

13. The second follows logically on the first. The frightful power of the atomic bomb makes it certain that any war fought between major powers doing equivalent damage to each other will be irrevocably lost by both of them. We have already seen in the war which has just ended how the damage done by even the older weapons can be catastrophic. We are finding in Germany and elsewhere that the process of social disintegration brought about by the war is such that it is taking all our resources to stop it even now when the war is over. It is not difficult to realize that, given only a slightly larger scale of destruction and confusion—and atomic destruction would be immeasurably greater—civilized life could never be restored and the whole fabric of society as we know it would collapse. The knowledge of this fact is a most powerful deterrent to the use of atomic weapons in aggression, except when the potential victim is vulnerable to the tempting degree which is the case with the British Isles. It has already been shown how this temptation would be removed or reduced by dispersal, and the moving back of the main base to less vulnerable areas. It only remains to ensure that any remaining threat of aggression is countered by the strategic deployment of our forces. Given dispersed targets, against which there could be no hope of a quick knock-out blow, and the threat of counter-attack from widely separated bases against her own vulnerable areas, I suggest that no nation will embark on atomic war. Our aim should be, therefore, so to deploy our air forces as to prevent war by the threat of action, rather than to follow our traditional tardy policy of seeking to reply to blows already struck.

III.—SUGGESTED STRUCTURE OF IMPERIAL DEFENCE

14. It has often been said in the past that we always fight at a disadvantage on exterior lines, owing to the configuration of the Empire, even though the balance was partially restored by the mobility given by sea power. It would now appear that the balance is tipped the other way. The British Empire covers such vast areas of the globe that concentric rings of strategic air bases could threaten almost any possible adversary. Provided that the British Isles are made a less tempting and vulnerable target, our blows could converge on a common centre, whilst those of our adversaries would, of necessity, diverge against scattered points on the circumference. The principle of concentration can be achieved as well by making the enemy disperse his forces as by our own actual physical concentration in time and space. The classic example of this was Lee's use of Jackson in the Shenandoah Valley campaign of 1862. Against the overwhelming Federal forces advancing on Richmond, the Confederate capital, the obvious defence was to concentrate all available Confederate forces in its vicinity. Instead, Jackson's bold handling of his detached force in the Shenandoah Valley created such alarm in Washington, the Federal capital, that the forces converging on Richmond were dispersed or recalled to meet the threat, the appearance of which he had created, and Richmond was saved. Similarly, our dispersed bases, aided by the mobility of air power, could create the necessary threat to force an enemy to disperse his forces. Could this widespread threat be achieved and kept before the minds of potential aggressors, actual war should never be necessary either in Imperial Defence or as the sanction of international law.

15. Having decided that the broad structure of Imperial Defence should consist of four or five main industrial and man-power areas, supporting strategic air bases as our main offensive and de-

fensive system, it is necessary to examine in broad terms the ensuing responsibilities of the three Services. As Maurice says, in "British Strategy," "The proper direction of industry may well be as vital as good generalship; the correct distribution of man power between the demands of armies and navies and the demands of industry will call for the nicest consideration." How true this prophecy was, the last war has fully shown.

16. It is probably safe to say that for a long time to come all heavy cargo will have to be carried in ships, both on account of its bulk and for economy. The structure of this important part of sea power is therefore unlikely to undergo much change. On the other hand, it seems likely that the protection of seaborne trade, and the interruption of the enemy's, will become more and more the responsibility of air power. This maritime air power will be exercised first from carriers and then increasingly by shore-based aircraft. Light warships other than carriers will still have some functions to perform, but it is probable that the Navy as we know it will gradually disappear. Battleships are already redundant, and the main argument used for their retention, that we must have them as long as anyone else has, is about as logical as saying that a club is the best reply to a club. Even in the last war the most dangerous adversary of a battleship was not another battleship. The history of the war in the Pacific does not show a single example of an attempt by Japanese heavy ships to interfere with the strung-out American lines of communication, even in the period after Pearl Harbour when the Americans had no serviceable battleships available. This was undoubtedly from fear of the American aircraft carriers, whose striking power had not been affected by Pearl Harbour. The responsibility of the Navy in the future will be, therefore, sea transport, oceanic convoy escort, and anti-submarine operations.

17. It seems likely that the functions of the Army will not be reduced to the same extent as those of the Navy. It will always be necessary to follow up by occupation the blows of the air forces. There will always be areas in which air forces cannot use sufficient discrimination to be able to operate efficiently, and in these the responsibilities of the Army will remain much as at present. The emphasis throughout will, however, be on mobility and especially on airborne and airsupplied forces. It is easy to envisage, for example, the large-scale airborne invasion of an area in which atomic weapons were being manufactured, or deployed. Defence will have to be provided against similar attacks on us, and also for our strategic air bases. Law and order will have to be maintained as at present. For all these responsibilities, however, the requirement is the same as for air power—strategically placed bases to and from which reinforcements could rapidly be moved by air.

18. The main responsibility for defence and attack will rest with the air forces in the future to an even greater degree than at present. The essence of the successful use of air power in either Imperial Defence or international enforcement action is mobility. Our air forces must be capable of offensive or defensive action in any part of the world at short notice. It is a common fallacy to assume that air forces are inherently mobile. They are governed in their own sphere by the same limitations as naval forces. They must have fully equipped bases in all areas where they are called upon to operate. Their mobility goes up in inverse ratio to the supplies they have to take with them. Experience in the last war has shown that a very complex ground organization has to be set up before modern aircraft can be operated, and this is not likely to be less so in future. This organization cannot be improvised, and future wars will not allow the breathing spaces to which we have become accustomed in the past. Our experience with the planning of "Tiger Force" for the Far East shows the difficulty of moving modern aircraft without a previous base organization in the required area. In spite of the supposed mobility of air forces, it actually proved easier to operate naval vessels far from their nearest base than it did to operate aircraft in the same area. We come, therefore, to the conclusion that air power, like sea power before it, depends for its effectiveness on the possession of a chain of properly equipped bases. Without them its mobility is largely illusory, and without mobility the structure of Imperial Defence is unsound.

IV.—REQUIREMENTS FOR IMPERIAL AIR BASES

19. We have seen with sea power that our Imperial strength in peace and war has depended on chains of naval bases along the vital sea lanes. These bases we acquired by a combination of foresight and luck. Some of them are also suitable for air bases, but in most cases of a secondary nature only, as so many of them are on small islands or in otherwise naturally limited territory. Modern war has shown that main bases must have space to protect them. The fall of Crete and Leros is more typical than the stand of Malta. Our main air bases must therefore be in areas where there is plenty of space for the dispersal of airfields, personnel and supplies, and which cannot easily be overrun. They must be in areas which are, or can be made, reasonably healthy. Each main base area should be capable of supporting large self-contained air forces or fleets.

with all facilities for waging war. Each main base area in turn would be the industrial responsibility of one of the main Imperial population areas already suggested. The air forces in each area would serve on a permanent footing with all facilities for families, recreation and communal life.

20. The main strategic areas in which we should establish first-class air fleets are suggested as: the British Isles, the Middle East and Africa, Canada, Australia and India. Each of these areas should be capable of operating their fleets for long periods supported by their respective industrial areas. This plan presupposes a large degree of standardization of equipment and training between the various Imperial air forces, but as this has already been largely achieved it should present no difficulty. The Imperial air forces garrisoning each area would be largely integrated, the actual command in each area being under the predominant partner, and the whole co-ordinated by an Imperial Chiefs of Staff Committee. Each air fleet would be equipped with a balanced force of suitable aircraft according to the development of air weapons which had taken place.

21. In the allocation of our air forces we must resist the temptation to disperse too much, disastrous examples of which are to be found on every page of our national history. Any detachments from the main areas which are necessary should therefore be sufficient for a limited purpose and no more. We should avoid tying up penny packets of squadrons in secondary areas, and must distinguish carefully between internal police requirements and those of global strategy. Each main air base area should be responsible for outlying secondary and advanced bases. The Middle East might be responsible for the whole of Africa; India for Burma, Persia and Iraq; Australia for the East Indies and Singapore; and Canada for trans-Polar operations, the Pacific, China and Japan. Operations, either for practice or to restore order, would be run on a field or practicecamp basis with detachments from the main base. All units in the main command would be called on to carry out regular attachments under field conditions in the outlying secondary and advanced areas. After perhaps three months' practice campaigning and reinforcement flying they would return to the main area, in which they would be permanently stationed with their families. At longer intervals inter-command postings would be carried out, to provide new blood and

22. Civil aviation will have an important part to play in Imperial Defence, just as the Merchant Navy has always had. Civil air routes in many cases will be military reinforcement routes. The development of civil flying alongside military fly-

ing can be expected to follow a parallel development with that of the Royal and Merchant Navies. It is very important to build up vigorous and efficient civil air transport services for trade in peace and to aid mobility and relieve the strain on shipping and ground transport in time of war. Every effort should be made to develop a standard cargo air liner, the tramp of the air, which would be invaluable in peace or war.

V.—International Enforcement Action

23. It will be clear that what has been said above applies equally to international sanctions. We are required under the Dumbarton Oaks Charter to hold an Air Force contingent immediately available for international enforcement action against breakers of the peace. If the lawbreaker is a small power the air action taken will be similar to police work within the Empire; if it is a great power then enforcement action can only mean major war, for which our dispositions are already made. The self-contained air fleets based on independent industrial areas in various parts of the Empire are fully competent to perform either role as required. Similarly, our bases will be available for air contingents from the United Nations.

24. It will probably not be possible, however, except for countries within the Empire, sufficiently to standardize equipment and supplies to ensure true mobility for the air forces of nations not so equipped. Any enforcement action in a particular area is therefore likely to be in two stages: first, action by the national air force best placed geographically; secondly, by the air forces of other nations at a later stage. It should be the aim of the United Nations to reduce the delay between the two stages by allotting airfields provisionally in advance, and carrying out regular reinforcement practice flights as part of peacetime training. R.A.F. formations might, for example, carry out manœuvres in the U.S.A. or in the Pacific along with the U.S. Air Forces, who could be given reciprocal facilities in the Empire. The same could be done with other members of the United Nations, according to the political and diplomatic factors prevailing.

VI.—Conclusion

25. The defence of the British Empire and Commonwealth is, as it always has been, as much a political and diplomatic matter as a military. We have always depended on a good system of alliances to aid our own military strength, and in all our recent major wars have been greatly assisted by the moral strength of our cause. The loss of the American Colonies was directly attributable to the unusual combination against us of

all the European maritime powers, and our resulting temporary loss of command of the sea. We must maintain the closest possible relations with the United States, as with the certainty of their backing the exposed position of the United Kingdom ceases to be such a temptation to

aggression.

26. I make no apology for dealing at such length with the political and economic implications of atomic war on the structure of the Empire. It is merely putting one's head in the sand to discuss and prepare plans for the use of air forces in Imperial Defence, unless the base upon which those air forces depend can first be made secure. That security of the base which all great commanders have deemed essential cannot now be assured in the case of the British Isles. The British Empire at present contains no part with a quarter of the actual war potential of the British Isles, and the maintenance of this state of affairs in the face of atomic weapons would constitute race suicide. Security can only be given by dispersal.

27. Given the assurance of the security of their main bases (by duplication, dispersal and alliance), it is suggested that our air forces should be deployed in the strategic centres of the Empire, the British Isles, the Middle East, India, Australia and Canada, in independent self-sufficient commands. Arrangements will have to be made with the Dominions as to what share they wish to take, and whose will be the main responsibility in each area. From each of the main commands indicated above, secondary and advanced bases should be established, which would be maintained largely on a war footing by training attachments throughout the year. Bases are, however, useless without properly balanced air forces to operate from them. It is just as true to-day of air power as it was of sea power when Napoleon wrote to Soult in 1814: "Fortresses are nothing in themselves when the enemy, having command of the sea, can collect as many shells and bullets and guns as he

pleases, to crush them."

28. The role of our naval forces will become less important as more of their functions are taken over by air power. The other two components of sea power, merchant ships and ports, are likely to remain almost as important as ever. The responsibilities of the Army are likely to be first, as a highly mobile and airborne striking force;

secondly, as a garrison and police force.

29. Although the difficulties which confront us in the Empire are very great, our advantages are also immense if we fully exploit them. With the mobility which properly based and organized air forces would have, the vast size of the Empire becomes its greatest asset under modern conditions. There are few potential aggressors against whom we cannot develop a threat from air striking forces. Many of our advantages will disappear, however, unless we are able to produce a more settled state of affairs in the Middle East and India, which between them represent the strategic centre of gravity of the Empire. This again, though a political and not a military problem, cannot be ignored, as, should unrest continue, two more of our proposed main bases become insecure.

30. It will be seen that there are several very important political and economic provisos which must be accepted before we can embark on a comprehensive scheme for Imperial Defence. It is quite useless to plan one without the other. But, provided that these developments go on together, the employment of our air forces as suggested in this paper would satisfy all the principles of war, and enable us to meet our imperial and international responsibilities. However, as Bacon has it in his essay on the "Greatness of Kingdoms and Estates," "Walled towns, stored arsenals and armouries, Goodly Races of Horses, Charriots of Warre, Elephants, Ordnance, Artillery and the Like. All this is but a Sheep in a Lion's skin except the Breed and Disposition of the people be stout and Warlike."

The Few—in Peace-time

By Group Captain A. H. H. MacDonald, R.A.F.

T the end of every costly war the Government, with the advice of the heads of the Fighting Services, must, in the needs of national economy and security, find the answers to three questions:

- (a) What minimum forces must be maintained?
- (b) As as result of the experience of the last war, what military equipment and forces are likely to be required in the next war?
- (c) What preparations should be made in peace time to meet the military requirements of the next war?

Decisions on these three points are very difficult to make. In the past there has generally been a tendency for the politicians to concentrate on civil reconstruction and cut expenditure on the Fighting Services and preparations for the next war beyond the limits considered "safe" by their Service advisers. The present situation is no different from many others in the past, except in degree. Instead of sending armies to battle, the whole nation now goes to war. The general principles of war remain the same, but certain factors have acquired added significance. These are that:

- (a) Only a highly industrialized country with access to certain raw materials can go to war alone against another such country with any chance of success.
- (b) Owing to the effectiveness of modern military equipment, a country which is unprepared to meet and launch an early offensive is liable to be incapacitated during the early stages of the war.

At the present time there are only three great Powers to whom factor (a) could apply—U.S.A., Russia and the British Empire. Factors (a) and (b) probably apply most favourably to these countries in the order in which they are placed above. These statements refer only to countries that might go to war on their own and do not take into account any possible alliances between them, or with lesser Powers, such as the suggested Western "bloc" consisting of England, Western Germany, France and Italy. Any such hypothetical groupings are outside the scope of this article, as are also the possibilities of weakenings due to internal labour or political unrest.

If these principles and factors are now narrowed down to their application to the Royal Air Force some idea can be obtained of what our commitments in this direction should be during the next few years.

(a) MINIMUM FORCES REQUIRED

(i) Police Duties.—This includes those R.A.F. units required for tribal warfare in the Middle and Far East. Their strength can be determined by the Chiefs of Staff. Their equipment need not be of the latest type in order to attain their aim.

(ii) International.—We have not at present contracted any alliances or guaranteed any specific force for international use. If we did, however, our contribution would probably have to consist of a small, highly trained force main-

tained with modern equipment.

(iii) Striking Force.—It is on this force that the country would have to rely during the early stages of a war, and the term here embraces all types of Service aircraft. Whatever its size, it is therefore essential that it, too, were highly trained and maintained with the most modern equipment. The force at (ii) might form part or the whole of our striking force.

(b) Forces required for Next War

The Staffs of the three Fighting Services are mainly responsible for estimating the military strength of potential enemies and allies, the form that war is likely to take and the military equipment and personnel required of the Empire. Without this estimate it is obviously impossible to make detailed preparations.

(c) PREPARATIONS

These cannot be determined in detail until the estimates in (b) have been prepared, but if certain assumptions are made it will be possible to obtain some idea of the nature of these preparations.

Assumptions

- (i) A national effort will be required calling on the total industrial and labour resources of the country.
- (ii) A considerable expansion of the peace-time R.A.F. will be required in a short time.
- (iii) The effectiveness of the R.A.F. (apart from the peace-time striking force) will depend, in the first place, on the speed with which trained personnel and the most up-to-date equipment can be supplied in large quantities.

If these assumptions are accepted, it can be stated that preparations come under the two main headings Equipment and Personnel. In the case of equipment, the procedure is simple in theory though difficult in practice. Based on the Staff requirements for the next war, it is necessary to build up a shadow organization to supply the

finished articles in the quantities and time required. The nearer this organization comes to the raw material the more it comes under civil and Government control, so that one of the essential precautions to be taken is to ensure that this gap is properly bridged by having civil and Service personnel working together. For any given article, whether it is aircraft, gun, parachute or split-pin, the procedure is about the same; the order being: a raw material, transportation, research, test, production; with labour as a constant factor throughout.

It has been stated above that one of the requirements in peace time is a small and up-todate force. This can only be built on the foundation of a highly developed research organization, and this is admittedly a considerable expense. Yet if this organization is allowed to fall below the level of similar organizations in other countries we will be endangering the safety of the Empire and can no longer claim to be a first-class Power. The first question for the "Preparations" branch with regard to any new equipment put forward by the research, development and test branch is: Can this be produced in large quantities in a short time? As regards the testing of new equipment, we are singularly well placed, as there are R.A.F. units located in the Empire under almost every condition of weather and terrain. Full advantage should be taken of this circumstance. The R.A.F. personnel required in this "Preparations — Equipment" branch amount to a considerable number, but they are as important to success in the next war as the research organization, and their numbers should not be allowed to fall below the safety level. On them will fall the responsibility (so far as the R.A.F. is concerned) of having ensured that the best equipment is produced in the required quantities in the shortest time. They need to be carefully selected according to their aptitude for their various jobs. They need to be above the average in basic intelligence, and have a background of practical experience which should be brought up to date from time to time by periods of Command or Staff appointments in the peace-time executive Air Force, or possibly in factories and workshops.

This introduction is intended to bring out the fundamental fact that, so far as the R.A.F. is concerned, a small executive Air Force and a "Preparations" branch will be responsible for early air action in the next war, and that these two organizations must therefore be highly efficient and up-to-date in peace time. On the equipment side this can be ensured by preparations with regard to raw material and transportation and by concentration on research, test and

methods of production. It is only logical, therefore, that equal care should be taken to produce the best personnel, and it is to this subject that the following remarks will refer.

PERSONNEL

Aim

It is assumed that the aim is to obtain the best personnel for duty in the R.A.F. in peace and in war.

General Method

In the matter of equipment the procedure in modern times is well developed and considerable trouble is taken in finding the best materials, and in research, development and test. As a result there have been phenomenal advances made in science during the past fifty years. The question arises: What corresponding advances have been made in recruitment, selection, development and testing of personnel for the Services, and is it a subject that can be treated in the same fashion as material advances? Is the study of the mind and body a science capable of exact measurement? As regards the body, it is generally accepted that it is. By the aid of research, development and test in the medical profession, and in food, accommodation and exercise it is now possible to produce healthier people than in the past. There is no doubt that a still healthier people could be produced by applying some of the established principles of "breeding," but this is hardly a matter that comes within the scope of this article.

As to the mind, it must be admitted that little practical advance has been made in the R.A.F. in finding the best minds for its various purposes and developing them for their specific jobs. Some attempt has been made with regard to air crews, but only to avoid wastage while training them to fly, navigate, aim bombs or fire a gun. The qualities required for these purposes, however, are not necessarily those most needed for the more responsible duties of command, organization, planning, training, research, etc.

Selection

Each period in history adopts a system of selection in keeping with the social structure of its society. One hundred and fifty years ago an officer had to come from a well-defined social class; he had to have private means, and he usually obtained his commission and promotion by "influence" or purchase. At that time it would have been idle to point out that wars might be fought more effectively if some method were adopted of selecting officers for their aptitude to their appointments. Such procedure would not

have been in keeping with the social order at that time.

During the last century, and the beginning of this one, advances have been made by widening the field of recruitment, the introduction of examinations and by promotion through confidential reports and selection by a "Board" of a few senior officers. But there is always a certain timelag between the need for reform and its introduction. In the past, a generous time-lag could be allowed with safety since changes in the social order came slowly. But during the past twentyfive years there have been such fundamental changes in the order of our society and such advances in science that the introduction of the reforms must also be speeded up unless we are to be left behind and endanger the safety of our country.

The need for a reform generally becomes apparent when a minority produces indisputable facts making it evident that reform is desirable. The majority then has to be convinced that reform should be introduced and decide on what form it should take. This state of affairs exists at the present time on the general subject of selection and aptitude of individuals for their jobs. During the past quarter of a century considerable research work has been carried out by small numbers of specialists: in the purely medical field by psychiatrists and in industry by the psychologists. The educational authorities both in England and America are also making increasing use of intelligence tests and "Aptitude Boards" in aiding students in the choice of careers.

In the Fighting Services the application of modern methods of selection have not been so readily introduced, partly on account of the conservatism of these Services and partly because the need was not so apparent until about 1940. By that year the Army discovered that a disturbingly large number of officers who had been granted commissions after a short interview before a "Selection" board of senior, experienced officers had later proved unsatisfactory in their commissioned rank. The Air Force found that because a man was healthy, young and recommended by his commanding officer, he did not necessarily make a good pilot; and considerable time, money, labour and material was wasted in training many of these individuals who had to be rejected often at a later stage of their training.

To the Army must be given the credit of being bold and resolute in this crisis. They consulted the small minority of experts available and these, in the first place, gave them overwhelming proofs that selection by interview with a board of officers was (as suspected) quite unreliable. This was no reflection on the officers; they were being asked to do the impossible. It was as though a test pilot were told to pass judgment on an aircraft after inspecting it on the ground for a quarter of an hour. The experts were therefore asked to submit their solution to the problem. Their methods were put to the test and the results were so outstandingly successful that by 1942 the system had been adopted throughout the Army, and later to a large extent by the Navy. The Air Force, as mentioned above, approached the matter from a different point of view. Whereas the Army were seeking firstly "officer qualities" and secondly "specialist" aptitude, the Air Force were looking solely for "air crew." Many of these air crew were later given commissions on recommendation by their commanding officers and a small board of officers, and some almost "automatically."

The method of selection devised by the experts for the Army was built on a foundation of all the tried and accepted practices devised by research workers in this field in Europe and America. Their first step was to make an analysis of the qualities required of an officer both "as an officer," and as a "specialist" according to the branch of the Service in which he would serve; this analysis was colloquially known as a "job analysis." A detailed description of the methods applied to determine if a candidate was likely to make good" as an officer in any of these branches would take too long to describe here; nor is the author competent to undertake such a highly technical task. Briefly, it may be stated that the candidate's qualities were examined and a relative value arrived at in detail and as a whole. All the "headings" could not be given here and it would be misleading to single out the most outstanding. Nevertheless, it is ventured that a general idea can be obtained if they are listed as Physical Fitness, Practical Ability, Specialist Aptitude, Character and Basic Intelligence. But in this list the term "Character" would have to cover so many sub-headings as to make the term almost meaningless.

The Boards last from three to five days and vary in composition. In general they consist of senior experienced officers as President and Vice-President; a team of four to six younger officers who concern themselves mainly with the physical fitness, practical ability and character of the candidates; a team of psychologists who apply certain accepted "tests" which indicate basic intelligence and give pointers as to character; a psychiatrist who, with the aid of the others, forms value as to character and any abnormalities in the mind. Each candidate is given an interview with the President, Vice-President and psychiatrist. These interviews may last anything from

twenty minutes to two hours. The Board meets for a final conference at which all the reports are studied in respect of each individual. These consist of about eight "Practical" reports, three interviews, the basic intelligence results and about eight psychological aptitude tests and character pointers. It is interesting to note that at the final conference there is usually full agreement on the majority of candidates. In only a few cases is it necessary to read out all the reports in full and discuss them in detail. Border-line cases are generally "passed."

The psychiatrist is a qualified doctor of the mind, while the psychologists are concerned with the working of the mind. A comparison might be drawn with an aircraft going into a workshop. The President is the general manager, the psychiatrist the chief engineer who is called upon in the case of difficulties, the psychologists are the mechanics and the practical officers the test pilots.

The presence of a psychiatrist on these boards has sometimes given rise to adverse comment by those not fully understanding his function. There is also a certain prejudice against them in the Services due probably to two reasons: firstly, that the profession of psychiatry has been compromised in the past by the publicity given to many "quack" doctors, and, secondly, because they have appeared to shield "moral fibre" cases. This latter point can perhaps be better understood if the individual is compared to a faulty aero engine. The commanding officer says that it "won't go," the engineer officer takes a more technical view, inspects it, finds out what is wrong and probably reports that it might be put right but it would take time. Just as an engineer officer does not like to be "defeated" by a faulty engine so the psychiatrist does not like to admit that an individual is a "hopeless case."

Basic intelligence tests have been in use for at least twenty-five years, and their value, particularly in combination with other tests, and in the hands of a recognized authority, has been acknowledged in an ever-widening field.

The tests are based on the discovery that the brain capacity (or capacity for thought) of an individual ceases to grow after the age of sixteen years. This fact generally comes as a shock to people learning it for the first time and their reaction is often one of disbelief and resentment. It is nevertheless true, and ample proofs are available if it is desired to study the subject. The brain capacity of an individual may be compared to a dry sponge, and what he puts into it to the amount of water it will hold. The sponge ceases to grow at the age of about sixteen and by that time varies in size in different people. The owner of a very small sponge must inevitably be of

below average intelligence, but the owner of a large one is potentially a very intelligent man. Reliable methods have been devised by which the size of a mental sponge can be determined. Until and unless this truth is accepted there is no point in considering modern selection or "aptitude" methods since it forms the foundation on which they are built. This brain capacity or basic intelligence index provides a definite indication of an individual's mental ceiling. And with the experience of hundreds of thousands of examples, a level can be determined below which an individual will not have the intelligence or develop the judgment to become a satisfactory officer.

Assuming that the most desirable mental quality in an officer is "judgment"—i.e., in complicated circumstances (physical, verbal or written) to make the best decision—many other factors are involved besides the requisite standard of intelligence. That most commonly quoted is experience" and there is no doubt that (other things being equal) a man of average intelligence and much experience will make a good officer. But it is equally true that a man of low basic intelligence cannot have sound general judgment. however much experience he may have gained. In such a case he may acquire a fair level of judgment in a limited field of endeavour through experience in that field, but this would help him but little if he were transferred to another appointment where the work was of a slightly different nature.

This short and therefore somewhat inadequate description of a type of modern selective method is not in itself likely to convince anyone of its efficiency, but it may incline those interested in the problem to go into the matter more fully. But assuming the need for the introduction of such methods, the next question that arises is: What exactly is required of the selection boards? Are they to select individuals likely to make good aircrew officers or are they to concentrate on potential air-rank officers?

This is a most important question for the future of the R.A.F. and a very difficult one to answer because the ideal solution is not capable of practical realization. What is required is a man who in his younger years is courageous, practical and a leader with aptitude for flying, etc., and in his middle age is intelligent, industrious, analytical with a quick brain at conferences and for dealing with files and general administrative or semitechnical work, etc. But these two qualities of the "doer" and the "thinker" are rarely found in the same individual in a high degree. Unless there is some form of efficient selective organization after a long war there is a danger that the balance

between the numbers of doers and thinkers in a Service may be upset and that one is left with a large number of gallant officers with excellent war records but who may not have the capacity or aptitude for the exacting brainwork and office work of the higher appointments.

From a purely modern selective point of view the solution would appear to lie in ensuring that all officers entering the Regular Service in peace time or being granted permanent commissions from the Service have the requisite basic intelligence and soundness of character to be potential air-rank officers. For short-service and war commissions the standard could be lowered, which would mean that some of these could adequately hold higher rank while others would reach their ceiling round about squadron leader level. From a practical point of view, there are difficulties owing to the time-lag in accepting a reform, and even the Army has had to compromise between the old and new methods when it came to the granting of permanent commissions to serving officers. But the Army has a longer tradition of conservatism in the older methods of granting commissions and promotion, and there would seem to be no need for the Air Force to hold back on this account. Shortly before the war and now after the war the view is often expressed that a good clearing-out of old "dead wood" is needed in order to let the younger men have a chance. But unless this is done on a scientific basis there is a grave danger that the result will only be to replace old dead wood by new dead wood.

If modern selective methods are employed, the first action would have to be, as in the Army, to make a "job analysis" for every apointment in the Air Force. This may, at first sight, appear to be a long and almost impossible task, but experience has proved that it can be done quickly and efficiently by a panel consisting of individuals with the proper qualifications and including selected Service personnel.

This would make it easier to lay down a clear policy for the recruiting branch and the selection boards. It may be, for instance, that officers or scientists on research, production or semi-civil planning, etc., would not need to reach such a high standard of flying ability as an officer destined by his aptitude for normal air staff work. With such a wide field of appointments needing special qualifications, it may be necessary to encourage various branches of specialization from an early stage.

Development

It was stated above that with the need for economy after the war the number of Regular officers would be cut to the minimum. Owing to

their great responsibility in preparing for the next war and handling the expanded Air Force, they needed to be carefully selected. Having been selected, it was in the interests of the Air Force to make the most of them and develop their abilities as much as possible. This development may be sub-divided into three categories: physical fitness, experience and mental. In the matter of mental development we stand at the moment. in a phase of historical progress. In the distant past the officer came from the governing class and it was not considered that he need learn to command; he was born to it. Then came entrance and promotion examinations, the Staff College and specialist courses. What comes next? Have we reached finality in development of character and mind or can something more be done? Modern research into the nature and working of the mind has shown that brain capacity differs according to individuals, but it has long been known that very few men develop their brains to the fullest extent. The average man is by nature idle and there are three important factors which go to overcome this idleness: motive, circumstances and aptitude. By motive is meant the inner desire of the man inspired by or for power, promotion, money, security, patriotism, religion, etc. Circumstances are the surroundings or conditions in which he finds himself which may or may not be favourable for his self-development. Thus the minds of officers stationed in a desert without literature, radio or visitors would tend to stagnate, but if the unit were ordered to England and given the job of research and test work on new aircraft and equipment they would at once come to life just as a plant flourishes in fertile soil and withers in arid ground. But each officer has an individual character with its likes and dislikes and its aptitude for certain activities. If these singularities are not studied and acted upon there will inevitably arise many cases of "square pegs in round holes" followed by unsuitability reports. But for every case where this has become so evident that a report is needed, there are a great many more where such a drastic measure is not taken. The unit is then served by a poor executive, while the individual suffers through lack of suitable development and possibly also from a sense of frustration.

It is therefore important that, in the comparative leisure of peace time, every effort is made to exploit these three factors so that each Regular officer is given appointments where he can develop his particular talents to his own and the Service's advantage.

The problem of motivation is too large to be discussed here, and "circumstances" will be touched upon later. But aptitude has a direct re-

lationship to selection, and some remarks may not be out of place. The old adage "Know thyself" is an admirable one, but it is a counsel of perfection and it is largely for this reason that educational and industrial establishments in America and Europe are increasingly adopting a form of aptitude boards. These are much the same as modern selection boards in structure, but there is one great difference in their aim. The selection board passes or fails the candidate while the aptitude board helps the accepted candidate. At the present time there is considerable difficulty, throughout his service, of an officer knowing his own capability and character, analyzing his aptitude and knowing enough about the qualities required in various jobs for him to decide what to go for. A large number of officers, therefore, either make a wrong choice or are posted to unsuitable jobs from which there is no machinery to repost them satisfactorily. The personnel staff deserve the greatest sympathy for the monumental task they have to perform without up-to-date tools. At present they have to rely principally on confidential reports written by officers whose judgment they cannot assess and whose reports have neither precise nor comparative value. For instance, a commanding officer of low basic intelligence and badly adjusted character but with considerable experience might recommend officers with the same qualities, and condemn a highly intelligent but diffident officer whose aptitude might lie in research work. Or an intelligent, intolerant man might adversely report on a "go-getting" type of flight commander who might make an admirable squadron commander, if no more.

How much easier would be the task of the personnel branch if they had access to the advice and reports of a modern selection and aptitude department.

The selection board could show it the original papers on each officer on entry into the Service. The aptitude boards could show it development at stages throughout his service including recommendations by the boards as to the type of employment he would be likely to do best in. Candidates for each promotion up to group captain, for instance, might be required to attend an aptitude board at each examination. By the time an officer reached the age of thirty the personnel staff would be able to study four or five detailed, unbiased reports by expert staffs trained for the purpose, and compare these with the confidential reports and service records. The boards could, in addition to applying the standard technique, encourage the officer to speak freely in confidence to the President, Vice-President and psychiatrist on any subjects he liked, such as his ambitions, dis-

appointments, interests and hopes, etc. The board could then, if it saw the necessity, address a confidential report to the officer, giving him such advice as might be of help to him. It would also draw up a report with recommendations as to employment, etc., for the personnel staff, signed (to ensure accuracy and impartiality) by the President, Vice-President, psychiatrist, "practical" officer and the psychological officer. Such boards would contribute to the general stability and morale of the Air Force, since officers would know that the aim of the boards was solely to help them; that all members were specially trained for the purpose; that each officer was given thorough and personal attention; that all members of the board were impartial, and that their qualifications were correctly appraised by the most reliable and exact methods.

But neither selection nor aptitude boards are to be recommended unless all the personnel comprising them are of the best available. No expense should be spared in obtaining the services of those most qualified in the country. Considerable care should also be taken in the formation of a board. There may be a dozen or more members and it is essential that they get on well together and have confidence in each other's ability and judgment. The board as a whole may be likened to a complicated and delicate precision instrument. Each piece must be made of the best material and fit into its place easily and exactly. As regards the President and Vice-President, it is open to question whether on aptitude boards they should be serving or retired officers.

A start can be made in using selection and aptitude boards without interfering with the present system. If their reports and advice proved valuable they could then be incorporated in the organization of the R.A.F. If they proved to be of no use they could be disbanded without damage to the existing structure. It is perhaps permissible here to speculate on the possible developments if they were accepted.

Circumstances

There must inevitably be a close relationship between recruitment, selection, training and the personnel branches (of which aptitude forms a part). The introduction of aptitude boards presupposes that the aim of training is to make every officer as fit as possible for his appointment; that of the personnel branch to see that all officers are given the maximum training according to their aptitude and are then posted and promoted accordingly. There is a danger that both these aims may become blurred through expediency. There is a danger, for instance, that examinations may be looked upon as more important than the train-

ing for them. The object of the training branch is not to find the best officers but to train all the officers to the highest degree possible. There is likewise a temptation for the directing staff of a Staff College to become a selection board instead of a training institution. In such cases the error would lie in the attitude of the training staff towards their pupils in not appreciating their aim, which should be to make every man "pass out top." Two analogies can be made which show the opposite extremes in the attitude of the training branch towards the students. In one case a career can be likened to a steeplechase in which the fences represent the various examinations and all the effort (except making the course and fences) is expended by the rider and horse. In the second case it can be likened to a car on the conveyor belt in the factory where the training staff are represented by the mechanics, inspectors, foremen, etc., and they make every effort to bring a car up to standard requirement at each stage of its career towards the finished article. The ideal condition would arise if individual officers could be inspired with the "motivation" of the horse and rider and the training staff with the ambitions of the staff of a well-run factory. But these analogies must not be pressed too far!

If these views are accepted it would seem natural that some directive should be given to officers when they enter the Service giving the general lines on which it is desirable that they develop their minds. It would form part of the duty of the training branch to encourage this development in every way it could. The main headings might be: Knowledge, Experience and Character. Knowledge could be sub-divided into knowledge of duties on which employed; of other Air Force matters; and of "outside interests." Character would include "self-expression" if this were not made a separate heading. There would then be a definite link between the recruiting branch, the selection boards, the training, examining and personnel branches and the aptitude boards. Once he entered the "machine" there would be a definite theme of mental development throughout an officer's career by which he received direction, encouragement, facilities and help.

Perhaps one of the first aims of training should be to teach officers the elementary rules of logic and self-expression both in speech and writing. A man's actions are the outcome of his or another man's thoughts and these thoughts are expressed by either the spoken or written word. It follows that the more clearly he thinks, speaks and writes the more efficient he will be as a member of the Service. That there is an urgent need for training in these subjects can be seen by reading almost

any file or orders on any R.A.F. station or, it is feared, by reading some of the "papers" and reports in higher formations.

Although environment cannot increase a man's basic intelligence, it can play a large part in developing his mind and it is open to question whether the average officers' mess in peace time provides a suitable background for this purpose. R.A.F. messes are, generally speaking, designed on the lines of Army messes, and these in their turn take their lead from those built during the Victorian period, when it was "bad form study one's profession or show any sign of intellectual development. In recent times a few tennis courts, squash courts and garages have been dotted around the mess as a result of the modern emphasis on material development. But inside the mess there is still the same uninspiring, barren, intellectual desert. The time-lag in reforming officers' messes is very much longer than the time-lag of the officers desiring reform. Presumably the Victorians were satisfied with their surroundings, but even the pre-war R.A.F. officers realized the shortcomings of their messes. This could be witnessed by visiting any mess either by day or in the evening. There was generally one large dining-room, one large ante-room. a small "ladies'" room and perhaps a billiard room. If there was a library it was probably a cupboard in the hall containing 70 per cent. crime novels.

And what was the result of this intellectual starvation in the home? In the evening the mess was empty except for the orderly officer passing away the hours as best he could in a desert of linoleum and Daily Mirrors. Is it fair to the country to continue this way? Is it not time that a "job analysis" were made of an officers' mess? What are the requirements for a mess? Are they not for the eating, sleeping, relaxation, social entertainment, physical development and mental development of officers of varying ranks and ages? The design of a "utility" or modern functional building would form an attractive subject for an architect. On the physical development side there might be "built-in" squash courts, a swimming-bath and space for table tennis and badminton. For mental development there should be a library and writing room and possibly a separate ante-room and dining-room for the more senior officers. Bedrooms and sitting-rooms could be designed, equipped and furnished to aid study. There could be a separate hall for lectures and cinema films. This might form the material background, but to obtain the best results it would have to be brought to life by the training branch (using this term in its widest sense and including "welfare"). For instance, there could be a librarian who possessed educational qualifications. One of his duties might be to arrange talks by local authorities, whether they be foremen of works, managers of industries, civil servants, politicians, authors, retired officers, scientists, artists or ex-Viceroys. He could also perhaps arrange for the showing of 16-mm. or 35-mm. films, varying from Walt Disney to the landing in France.

There are endless possibilities in making use of messes for the mental development of the officers. An officer showing a desire and aptitude for learning (say) typewriting, shorthand or languages should be given encouragement and the facilities for doing so because the knowledge gained could be put to the use of the Service. A more obvious example is concerned with mechanical aptitude. The Air Force when selecting individuals to be trained as air crew places a high value on their mechanical aptitude and this is shown by the numerous tests, devised by the psychological authorities, which they have to pass. This mechanical sense is therefore one that should be encouraged and developed. Almost all young officers own motor-cycles or cars and they delight in pulling these apart to make them run better. Yet most messes have to pay for the erection of their own garages and therefore cannot afford the expense of including inspection pits, good lighting, heating and a workshop. As a result, officers are continually breaking regulations and having their cars, radios, cameras, guns, etc., mended in station transport workshops or the flights. Surely it is illogical not to have these simple facilities

built in to the main mess building so that during the long winter evenings an officer could walk down a corridor to the workshop or garage and there apply and develop his aptitude for mechanical devices.

Conclusion

The war is over and we now have to lay the foundations of the new Air Force that is to carry on in peace time and prepare itself for the next war. In making these preparations the two main factors to consider are the changed conditions since 1938 and the need for economy. Both these factors point to the need for obtaining the services of the best type of officers for a great variety of appointments and training them to the highest degree of efficiency. An officer's value is mainly determined by his intelligence, character, training and experience.

The adoption of the methods outlined above would cost money, but the contention is made that their rejection would have even graver consequences. The art of economy is to know when not to economize.

The object of this paper has been to draw attention to modern methods by which intelligence can be measured, character developed and training allied to aptitude, encouragement and environment. The writer has referred only to officers, but the principles could be applied equally well throughout the Air Force to the N.C.Os. and airmen. We want the best and here, perhaps, is a sure way to get it.

The Meaning of Air Power to the British Commonwealth of Nations

BY GROUP CAPTAIN R. FAVILLE, C.B.E.

Introduction

ODERN war is total war and in assessing a nation's capacity for war, allowance must be made not only for the existing and potential military strength but also for the organization and scope of its economic resources, its geographical position and the character of its neighbours. The assessment of a nation's strength in time of war or peace is therefore a complex summation of all resources, emotional, psychological and material.

Modern war is sudden; it is the war of the blitzkrieg. The scientist and the technician have sharpened the tools, and by mechanization quick-

ened the pace of war. True, for the aggressor the planning and the preparation may take months or years, but these take place in the preceding peace. War is launched without warning, and nations are subjugated in a matter of days.

Finally, war is three-dimensional and is won by the successful integration of sea, land and air power backed by the civil power of the nation. Also the Second World War has seen the emergence of air power as the dominant factor in war. Not only does air power affect the strategy and tactics of war but also it has changed the balance of power in the world. Therefore its study in relationship to the British Commonwealth of Nations



is vital to us all and an appreciation of its requirements and limitations is essential to our national strategy.

THE LEAN YEARS

The R.A.F. ended the First World War with 188 squadrons and 16 independent flights, the total personnel being about 291,000 and 25,000 W.R.A.F. Within a year of the Armistice, in an atmosphere of "no more war," the R.A.F. had dwindled almost beyond belief and there was a very real threat of its complete disbandment. In 1919, however, Lord (then Sir Hugh) Trenchard, under the direction of Mr. Churchill, then Secretary of State for Air, prepared a memorandum for the Government and stabilized the policy for the Service. With a meagre annual financial provision of some £15,000,000 and a national policy until 1935 directed towards collective security and disarmament under the auspices of the League of Nations, it is remarkable that the R.A.F. survived. Doubtless, not before the history of this Second German War is written, will the people of the British Commonwealth of Nations realize how much they owe to the foresight of men like General Smuts, Lord Trenchard and Winston Churchill in defining the proper status of the R.A.F. as an equal co-partner with the Army and the Navy.

Hitler's assumption of power in January, 1933, followed by the resignations in the same year of Japan and Germany from the League of Nations, shattered all prospects for the Disarmament Conference and inevitably precipitated general rearmament throughout the member States. In so far as the R.A.F. was concerned, the first steps merely confirmed the need for the modest Home Defence programme recommended in the Salisbury Committee Report of 1923. Soon, however, the tempo quickened and each succeeding proof of German intentions provided yet another reason for an unending and often overlapping sequence of expansion schemes which continued long after the outbreak of hostilities.

THE STRUGGLE FOR EXISTENCE

Somewhat naturally the political procrastination of the period before 1933 adversely affected the growth of British air power. In particular, the Treasury's piecemeal defeat of the Services in turn provided the R.A.F., the junior partner, with a totally inadequate grant commensurate with the needs of development and scientific research in the field of aeronautics. True, the British aircraft industry showed constant courage in coming forward with private ventures, but with the Government such a disinterested customer real progress

was impossible and the industry received little incentive to expand.

The R.A.F., however, within the limitations of the strangling financial grant, but unfettered by bondage to the older Services, was not idle and developed a true appreciation of the conception of air power as it is known to-day. Together with pioneers such as Alcock, Ross Smith, Van Rynveld, Kingsford Smith and others, the Service secured for Britain a creditable place among the nations of the world in the race which, we now recognize, marked the dawn of the age of air power.

Distance, speed and height records rewarded courage and enterprise and confirmed the immense technical advances in a new science. The biplane gave place to the monoplane, undercarriages were made retractable and the variablepitch airscrew introduced. The supercharger on the one hand and the improvement in the quality of aviation fuel on the other revolutionized engine design. The strictly military potential of the aeroplane also was not overlooked and, in accordance with the dictates of the envisaged role in war, the Air Staff called for the requirements of defence and offence. The former was met by the introduction of the eight-gun fighter and the latter by the heavy bomber with its power-operated turrets. The geographical position of Germany, once again the potential enemy, fixed the range of the bomber, and the dictates of speed and rate of climb governed the development of the fighter.

THE CONFLICT IN EUROPE

Hitler had a true concept of the military strength of a nation and he used the threat of his mighty air force as the chief weapon in his campaign of military aggression—a campaign that almost succeeded without war at all! In fact, the G.A.F. accomplished more by what it did not do than with what it did. When battle was joined, however, it soon became apparent that, despite its separate entity, the Luftwaffe was essentially a Service complementary to the Wehrmacht and was based on the idea of air power as we know it to-day.

True, within the domain of continental war, the German integration of air and land forces achieved more than one swift and clear-cut victory. In addition, in the Norwegian campaign the enemy, using this same machinery of war, demonstrated conclusively the ease of passage by land forces of narrow waters outside the range of our shore-based fighters. Within this range air power, not naval power, was supreme. Dunkirk, on the other hand, provided the obverse: our air supremacy gave us freedom of the seas. This enabled a large proportion of our Army to be

saved in the miscellany of naval, merchant marine and pleasure craft hastily collected.

Then the Battle of Britain, where our qualitative superiority triumphed, where science in the form of radar ground warning stations provided an economy of force hitherto unknown in warfare and where also the Germans, by their failure to apply the principle of concentration, once more confirmed their lack of knowledge of the fundamentals of air power. Despite this ignorance, however, sheer weight of numbers almost prevailed and, but for the gallantry and tenacity of our fighter pilots all would have been lost.

In the Mediterranean campaigns the requirements for the successful conduct of three-dimensional war were painfully and slowly established. Warfare became largely a struggle for airfields. Flexibility of air forces, backed by a highly organized maintenance system with quick recovery and repair facilities, triumphed over numerical and often technical superiority of opposing air forces. The necessity to win the air battle before the land battle and the vital requirement that his victory should be maintained when battle was launched irrefutably ordained that the three Services must be considered as a single instrument of war. Failure to appreciate or implement this principle lost us Crete; on the other hand, the successful application brought rich rewards in North Africa, Sicily and Italy.

The pattern of conquest in Western Europe differed only in the magnitude of the task confronting us. The strength of German air power in this case was measured not in terms of the strength of the Luftwaffe in the field but rather as an integral part of the vast complex German war machine, secure within the heart of the Reich. The winning of the air battle was far beyond the scope of tactical air forces. Strategic bombing alone provided a weapon for the attack of the enemy's national potential and there could never be any question of establishing a powerful enough force in the West until the fighting efficiency of our enemy was seriously weakened. Then, and then only, was it possible to think of successful invasion by land forces to combine with our Russian allies in the defeat on land, and ultimate occupation of Germany.

AIR POWER AND NAVAL POWER

The campaigns in the European theatre of the Second World War have been essentially combined operations and the three Services have learnt to operate smoothly with the various arms of their allies in a common task under one Commander-in-Chief in the field. Germany, a Continental Power, relied traditionally on the Wehrmacht, this time supported by the newly created

Luftwaffe, and chose the submarine rather than the surface ship as the chief expression of her sea power. The few big ships our enemy did possess, however, were of sufficient quality to contain a considerable part of our naval and air strength. This threat enforced a defensive strategy and as a result delayed the evolution of the air fleets which later played so vital a role in our grand strategy.

As the war progressed, naval power, no longer synonymous with sea power, has felt the inexorable impingement of air power upon its traditional preserves, and, within the limitations of the range of land-based aircraft, retreated, sometimes reluctantly but certainly always gallantly. There are some who see in the development of the shipborne aircraft a possible resurgence of naval power. True, naval aircraft will always be an essential part of naval forces, but the land-based aircraft of a first-class Power, devoid of all the crippling limitations of design of carrier-based aircraft, cannot but remain superior in performance, in range, in hitting power or any other feature a future war makes vital.

In the European theatre we have been more than once embarrassed by the fact that naval forces can no longer approach a hostile coast or even exert their naval supremacy in narrow waters in the face of organized shore-based air opposition of a first-class air power. The Mediterranean route to our armies in the Near and Far East was denied to us, and not only was their reinforcement dangerously delayed by the long alternative route around the Cape but our merchant shipping tonnage was also virtually halved at a time when our shipping losses were at their highest and our economic resources strained to the limit. Furthermore, our main surface forces were unable to approach the Western European seaboard and thereby be certain of intercepting enemy major naval units employed in isolated raids on our sea-borne commerce. Rightly, we now accept such prevention as a task for air power, but this concept formed no part of our pre-war strategy and was established only in the hard school of experience. The protection of the merchant ship, so long as the sea was the only medium of approach, remained a naval problem. Now it is becoming increasingly an air problem and this is amply proven by the major role the aircraft has assumed in the killing of U-boats, the chief menace to our sea-borne communications.

War in the East was again a war of communications and airfields. Japan, however, appreciated this air threat and, by the occupation of Pacific islands on the one hand and the successful subjugation of French Indo-China, Siam, Malaya and Burma on the other, strove to seal China from the West and secure her base. Ultimately we saw the

United Nations' strategy orientated to regain airfields, cut communications and bring the air war direct to the heart of the enemy. Unlike the European theatre, distances far exceeded the range of military aircraft at that time, and until the operations of B29 bombers from regained Pacific island bases and on the mainland, the Pacific War had been essentially a duel between the carrier-based aircraft of the opposing fleets, followed by amphibious operations on an ever-increasing scale.

THE REQUIREMENTS FOR AIR POWER

It has been stated that the advent of air power will ultimately operate to Great Britain's disadvantage. This may be so, but there is no question, however, that a careful study of the requirements for the maintenance of a first-ranking air power for our nation and a full understanding of its limitations are essential to our national security. The R.A.F. has now given pride of place to the U.S.A.A.F. as the largest air force the world has ever known, but it should be remembered that at its zenith the R.A.F. was backed by an industry. in these islands, of some 2,000,000 workers and that the Empire Air Training Scheme alone provided an annual flow of 25,000 air-crew members and that neither figure represented the complete requirement for the Service. Some measure, therefore, of an air force in a major war may thus be gauged.

Also this war has shown above all else that mere numbers of aircraft are of no avail and that technical superiority over the enemy is essential. Again, before the war the normal time from drafting the requirements for a new type to the complete equipment of a squadron was five to seven years. The industry organized to war tempo only roughly halved this figure; therefore, some measure of the difficulties of maintaining an air force up-to-date and ready for instant war is manifest. Furthermore, the aircraft industry in the post-war period will be faced with the demands of civil aviation, the War Office, the Fleet Air Arm and the R.A.F. Rightly, the needs of civil aviation must inevitably at first receive priority, as the regimentation for war, to meet the increasing demands of the Services, has left us far behind in the openly acknowledged national race for dominance in this new field of transportation.

THE JET ENGINE

To these potent factors must be added the inevitable revolution in design and consequent dislocation in production of aircraft resulting from the successful evolution of the jet-propulsion power unit. Indeed, the far-reaching consequences of this new development cannot as yet be fully appreciated. From present indications,

however, two facts emerge. Firstly, the jet is much simpler in construction and therefore will eventually be cheaper to produce than the present reciprocating engine. Secondly, because of this simplicity, new types of jets may be produced at twice the rate of previous power plants. Should this be so, the rate of development of engines will, by present standards, be half the rate of airframe evolution and the planning of a future type of aircraft correspondingly complicated. To advance the rate of air-frame design in this country not only will it be necessary to augment the design and draughting staff of the aircraft industry to a scale unprecedented even in the Second World War, but also it will be necessary to raise the level of proficiency of several design teams. Our best designers lead the world; on the other hand, we now suffer, and will continue to suffer for months, even years, a man-power shortage the like of which we have not known before. Therefore, it is unthinkable that we should squander our labour on indifferent products.

Fortunately, the problems of the industry are not unknown. Already a lead has been given, in the planning of a College of Aeronautics on the one hand, and a drive to educate the younger generation to be aircraft-design-minded on the other. Education, however, is a slow process and some years are to elapse before the benefits are apparent. Maybe the Dominions can provide a potential field of recruitment; certainly their resources should be investigated and encouraged. The magnitude of the change of the reciprocating engine for the jet is comparable with the change from the biplane to the monoplane. That is to say, we are now on the threshold of a complete replacement of the aircraft as we know them to-day. and as our air fleets are expanded so we must correspondingly expand the staffs essential for their replacement.

THE LIMITATIONS OF AIR POWER

The ubiquity of air power was never more apparent than it is to-day and, with each new technical development, more and more falls to the lot of the military forces that employ this third medium of approach to the enemy, the air. In no former war has science been so constantly called upon to solve the problems of the forces in the field of battle. Improvement in weapons, improvement in instruments to find the target, improvement in safety equipment to make the use of the aeroplane independent of weather, and improvement in photography to locate the targets and to record results of attacks, all progress in direct proportion to the solution of these problems by the vast organization that backs the actual fighting service.

But limitations remain. We have seen modern war to be so much a battle for airfields—and the security of the base was never more essential. Aircraft with their increasing complexity gain in flexibility but lose in mobility and tend to depend more and more on close proximity to their industry. The restrictions due to weather are, however, at times the most embarrassing to air force commanders. Also, the army commander in the field must still provide in battle sufficient fire support from the ground and can rely on the air merely as an extra; therefore a complete economy in arms is not yet possible. Finally, unless the range of aircraft can be economically increased far beyond that deemed at present practicable, the emancipation of air power for world war will never be complete.

Given the centralized establishment for the study of aeronautics as already agreed and the industry to produce the types of aircraft this research decrees, there is no doubt that many of the limitations that at present exist will be eased and perhaps eliminated. On the other hand, as we pass from war to peace priorities will change. After the tremendous destruction of these past years of war the resources of the country will of necessity be applied to the provision of the common wants of man, food, clothing and a roof above his head. Also every effort will undoubtedly be bent to the re-creation of the industry upon which our foreign trade and future prosperity depend.

It is probable, therefore, that but for the spur of civil aviation years could elapse before any appreciable change occurs in the limitations of air power as we know it to-day. Because of this man-power shortage it may well become not only desirable but also essential for an increasingly large share of aircraft production as opposed to development to be decentralized and pass to the Dominions of Canada, Australia and New Zealand. Events in the Second World War have refuted any argument that distances make this scheme impracticable, and from the point of view of our post-war strategy the dictates of security may assess the transfer as vital.

GERMAN V WEAPONS

As already stated, a nation's strength in war and peace is bound up with its geography. Britain, therefore, for generations has rightly reckoned herself an island power, as opposed to a continental power, and looked to her naval forces as the natural expression of her power. On this basis Britain expanded to a maritime power and again quite rightly looked to her naval strength for security and the maintenance of her Empire, from

which she derived her status as a world power. In the late war, however, we have seen air power displace naval power as the arbiter of our freedom. It would be foolish to suppose that air power, as we at present know it, will always provide this security and we must in the future, unlike in the past, be ever ready to accept some revolutionary change in the conduct of war. Indeed, we have already had some foretaste of the probable form such a change may take.

It is too early to evaluate the German V weapons, but there is no doubt that they have come to stay in the armoury of man and that their introduction will affect not only decisions at the Victory conferences but also the peace-time strategy of nations. It should be remembered that they were developed to destroy London, the heart of our Commonwealth of Nations, and that the unchanging factor of geography ordains that London is always vulnerable to such attack from the continent of Europe. Some people think that V weapons are more efficient than bombers up to 200 miles, but that from 200 to 2,000 miles the aircraft is superior. To accept such a premise would not only radically alter the defensive strategy of these islands, but also make a good case for the removal of our capital to a more secure shore. Tradition, however, transcends geography and, while it is most improbable that a change will be made, it is equally probable that there will be a readjustment of the industry from which we derive our military strength.

On the other hand, given time, it is not beyond the wit of man to provide a counter to these weapons. History has shown few precedents to such a rule. We saw towards the end of the flyingbomb offensive the almost complete mastery achieved by A.A. using radar gun-sighting. Again we should remember that the German V-weapon attack was ill-timed and never reached its full intensity not only because of the splendid achievements of our land forces, but also because of the equally persistent efforts of our air forces. Indeed, rarely has the flexibility of the air had a more comprehensive test. Beginning with the photographic reconnaissance to aid our intelligence and provide target details for our strategic bomber forces, who so successfully delayed development and production of weapons, it ended with the attacks on launching sites, dumps and forward communications, which reduced the volume of fire. The campaign—and campaign it was—will doubtless never be cited as an example of economy of force; but it provides a worthy illustration of the adaptability of air power. Maybe our use of air and land forces gives a clue to the answer to such a threat and will provide a great stimulus to the creation of the air-borne army. The problems of such a force may well be one of our chief preoccupations in the future.

THE PATTERN OF THE FUTURE

The twilight of the German War marks a period of intense diplomatic activity and the statesmen of the world are gathering to endeavour once more to find a formula for the preservation of international security. As a result of these deliberations, all nations will determine their individual security policies. For us, more than ever before, will it be essential to base our plans on the needs of the British Commonwealth of Nations. This time, however, to protect our sea communications, as ever the vital factor, we can no longer base our strategy on the needs of sea power alone. The advent of air power has changed all that; in fact, the third usable medium of approach to an aggressor, the air, has prior claim and we must therefore reorientate our plans accordingly. To do this it is necessary to turn to the lessons of the war just ended and exterpolate. The development of the aircraft and modern weapons of war proceeds at such a pace that provision only for the present offers little prospect of security for the future.

Of all the lessons of the Second World War security of our air bases transcends all else; indeed we have seen the campaigns in the Mediterranean to be largely a series of battles for airfields. The security of our bases is no new principle. In the past all our forebears who went down to the sea in ships were unfailing in its observance. Indeed, we owe our very existence as a great nation in no small measure to our natural aptitude for acquisition of good bases. Remembering that our primary aim is the security of our sea communications, it is obvious that where possible we adapt our so carefully chosen bases to the new air/sea requirements. Unfortunately the requirements of the one are not always acceptable to the other. Whereas at naval bases provision must always be made for the defensive air umbrella, the dictates of a world-wide pattern of air dispositions may well decree that air bases be made far from the sea itself. We must look at the needs of ship and aircraft to understand more fully these differences. The surface vessel is confined to the sea and it has a capacity and range that will always stand supreme when it is operated in tropical and temperate zones. The aircraft on passage, on the other hand, is unaffected by the surface over which it traverses, and its range, being dependent only on the fuel it carries, is a maximum when its path describes a great circle of the globe. At the present state of development the aircraft is much more sensitive to weather conditions, but the introduction of the pressure cabin is inevitable and imminent. With it the aircraft will pass above the restricting meteorological systems and achieve complete independence. Even now, to plan efficiently we must turn to the globe, not Mercator's chart, to understand fully air highways. All modern aircraft have provision for auxiliary fuel tanks as alternatives to bomb or armament load; therefore, reinforcing range already bears a comfortable margin over operational range and can be reckoned as some 3,000 nautical miles for heavy aircraft and half that distance for lighter types. As it is improbable that the improved aircraft at present in the requirements stage will be available for five or more years, we must plan our bases to conform to the needs of existing equipment.

To return once more to the lessons of the war. our early defeats were so often caused by lack of aircraft, and the quick recovery and repair of damaged aircraft alone enabled our commanders to exploit flexibility and thereby stave off complete collapse. Furthermore, as it is unlikely that we will ever change to an aggressor nation, a part we have long foresworn, and as our peace-time economy will always demand a minimum frontline strength, this condition will remain. Therefore, in any future war there will inevitably be a hiatus before the industry is fully mobilized. We must buy time with space, and never more can we afford to look to this country alone as our only source of supply. Neither can we count as before on the good offices of the United States to fill the gap, as the advent of air power has removed for ever that nation's isolation. No, we must make preparations now for the manufacture of aircraft at focal points throughout our Commonwealth of Nations. Our territories are worldwide, our vulnerability is likewise world-wide.

The over-all picture begins to take shape—air bases near naval bases where possible, centres of aircraft manufacture and maintenance at focal points throughout the Commonwealth, and, joining all, a system of air staging posts within flying replacement range. Unlike naval bases, the requirements of air bases, because of the more fluid state of aircraft development, are less easily defined, and again we must exterpolate, this time bearing in mind particularly the development of weapons both for defence and offence. This much we know: increasing size of aircraft has called for longer airstrips. Fortunately the imminent general introduction of the reversible pitch airscrew, which will reduce the landing run, and the more general embodiment of the already proven aid of reaction devices for assisted take-off, indicate that our present first-class airfields may be adequate for the future. Again, we know the need for dispersal to ensure security and that the limiting number of aircraft at one airfield, although varying slightly with type, is far below the number required to provide for tactical and strategical offence and the defence of the base. Therefore the requirements at a focal point will be a series of airfields and landing strips, the number depending on the grading of the base. Four factors will govern the actual location—local security, the link with sea communications, the terrain and the climate. Compromise is inevitable, but the ability to erect a first-class radar warning system is vital.

CONCLUSION

To recapitulate, victory in modern war is won by the successful integration of the three Services in one smooth-working machine fed by the civil power of the nation. On the other hand, the advent of air power has meant that the winning of the air battle is a prerequisite of victory. But modern war is sudden, the requirements for a nation at war are far beyond the scope permitted by any system of peace-time economy and it is necessary to buy time with space. This alone is not sufficient, however, because air forces to be

effective depend on their technical superiority over the enemy and at present the aircraft is passing through a revolutionary phase in its development. Therefore only a nationally inspired organization for scientific research and technical development can ensure for the British Commonwealth of Nations an adequate machinery to achieve the progress essential to us if we are to remain a major power in the world.

Therefore, the member States of the British Commonwealth of Nations must now develop a self-sufficiency hitherto unknown. Fortunately the industrial development of the Commonwealth, stimulated by the stress of six years of war, has laid a firm foundation. This industrialization must, however, in the peace to come, be fostered by the Mother Country and the measure of its development alone will provide the measure of our security. The reasons are not far to seek. The inevitable dispersion of our technical man power and our economic resources for war, the fillip to our sea and air transportation systems, the strengthening of the ties between the mother and daughter States are the very essentials for our strength as a nation to meet the threat of modern

The Empire's Air Power and Air Bases

By SQUADRON LEADER W. L. CLARKE

"The possession of the strategic points decides the success of the operations of war."—Archduke Charles.

THE purpose of this essay is to show the importance of air bases to the British Empire, and to suggest the requirements of an air base. Throughout the argument sea power and land power have been touched upon lightly. That is not meant to imply in any way that they are of secondary importance. Modern war is becoming more and more a series of combined operations, where each Service must play its part. Lord Trenchard, writing in the Daily Telegraph of 4th February, 1942, said:

"All strategy (land, sea and air) is interdependent and interlocked, and the extent to which one or other arm predominates is determined by a country's material policy, its geographical position, the character of its population and the nature of its resources."

The British Empire embraces land in all parts of the world, and people of many characters. But one thing is common to all—the air. It is a "universal navigable ocean that comes to the

threshold of every man's door." The air has therefore the capacity of being the highway linking each part of the Empire. It will be in the future what the sea has been in the past. There will be one difference—one of immeasurable importance in time of war—the speed along the highway will be greatly increased.

. EMPIRE UNITY

"Strength united is the more powerful." BACON.

All nations have interests which are vital to their security and which they must therefore protect. In addition, many nations have international obligations which they must fulfil. It may therefore be necessary for a nation to persuade another nation to its way of thinking or to impose its will upon that other nation. If diplomacy and economic pressure fail, this must be done by force of arms; the nation is at war.

When a highly organized industrial power is concerned, the national war effort will probably entail the use of all the national resources available. It will be necessary to put into the field armed forces capable of defending the homeland

against enemy attacks and also of attacking the enemy. It will be necessary to feed and clothe these forces and to provide them with arms and the materials of war. To do this, not only must food and raw materials be available in large quantities but the people must be organized to make full and effective use of them.

During a war the communications of a country might at times be made difficult or impossible by enemy action. The country must then be able to live on its own reserves until such time as new stocks can be brought in. Thus the resources of a nation must play a vital part in its ability to wage war. A highly developed nation self-contained and self-supporting is in a good position to defend itself against attack, to protect its interests, and to fulfil its obligations.

What is the potential capacity of the British Empire when viewed in this light? Individually no part of the Empire is self-supporting. The parts have become so economically and politically interdependent that the loss or injury of any one of them would seriously damage all the others. The United Kingdom depends for a large proportion of its food and raw materials on the Dominions and Colonies. Nearly one-half of Great Britain's food came, before the late war, from Empire countries. The Empire's agricultural and pastoral producers are dependent to a high degree on British markets. In return the Empire takes nearly one-half of all the goods exported by Britain and more than half the manufactures.

Throughout the Empire are found supplies of: some of the most important and essential commodities of the world. Rubber, wheat, minerals, dairy produce, to mention only a few, are all to be obtained. There is, however, no single part of the Empire where all the commodities are found together. Each part must import to maintain its life, and export to keep its economy sound. No part of the Empire, except perhaps the United Kingdom, has a highly developed industrial system with which to produce all kinds of materials of war. The present war has shown that even the high state of industrial mobilization achieved in the British Isles is not sufficient to supply the needs of a modern war against a powerful adversary. The British industrial effort depends to a great extent upon the supplies of imported raw materials. Individually, then, the units of the Empire are not economically strong. They could not hope to exist singly in a hostile

When the problem is considered with the Empire as one unit, however, a far different picture is seen. Collectively the British Empire is almost entirely self-sufficient in natural resources. There

is, however, one serious deficiency—oil. The quantity of oil produced by wells in Britishowned land or by wells under British control is far from sufficient to meet the needs of Great Britain alone even in time of peace. It is not too much to say that the Empire is dependent for its supply of oil and petrol upon the United States of America. There are resources in the Empire as yet undeveloped which might reduce the dependence to a large extent. It is in the interests of the Empire to see that these resources are developed to the full.

In addition to its natural resources, the Empire has great opportunities for the development of hydro-electric power. There are, too, large areas suitable for industrial development. The Empire has therefore the capacity to disperse industries and so safeguard them from enemy air attack. An intelligent dispersal of industry would have more than this one advantage. It would also reduce the distances across which the raw materials would have to be transported. By doing this more ships, trains, road transport and aircraft would be freed for other loads.

Thus we see that an Empire which planned its economy and strategy as a single unit would immediately overcome almost all the difficulties which its separate parts would individually find prohibitive. It would give itself power to resist the threat of any other nation. It would be in a position to safeguard the rights of smaller nations and to fulfil its obligations to them. It is not suggested that, in adopting a unity of planning, the Dominions and Colonies should in any way lose any of their rights or independence. Each part of the Empire must discharge its own responsibilities of government and administration as it is doing at the present time. It should be possible, however, within the countries concerned to develop those industries, forces and bases, which, in addition to strengthening the country's security and economy, would also fit in with the economic and military strategy of the Empire.

EMPIRE COMMUNICATIONS

"I'll put a girdle round about the earth In forty minutes. . . ."

-SHAKESPEARE.

In an empire stretching round the world the lines of communication are of primary importance. In peace they are important because it is necessary to carry from one Dominion to another the food and raw materials to maintain life and industry. In war their importance increases because they must carry, in addition, the troops and materials of war.

Mobility is one of the principles of war. Unless

our forces with their equipment can move quickly from one theatre of war to another, the security of the Empire will be greatly impaired. It is essential, then, that the communications between the Dominions are not only as secure but as speedy as possible. The Empire is joined by all forms of transport: road, rail, sea and air. Nevertheless, at the present time it is by sea that the main commodities are brought in bulk to the industrial centres. The burden thrown upon the Merchant Navy in time of war is therefore great. The submarine threat makes the convoy system a necessity. But the speed of advance of a convoy is the speed of advance of the slowest ship, and the speed of delivery of the goods is therefore much reduced. In addition, the sea routes of the world have to be guarded by surface vessels and aircraft against submarines, surface raiders and air attacks. Thus sea transport must absorb a large portion of the Empire's naval and air forces. The Battle of the Atlantic showed only too clearly how great this effort had to be.

The late war has seen a great development in the use of aircraft for transport purposes. Already we have seen large numbers of troops and tanks transported by aircraft. If this could be developed to the stage where all troop movements, and the transport of all but the heaviest and bulkiest of equipment, are done by aircraft, then the mobility of the Army will be greatly increased. If this can be done, then it is logical to suppose that some of the less bulky items normally carried by sea will also be carried by air. Not only would the goods be transported more quickly but the burden on the ships would be eased. This would release ships which could be formed into additional convoys. With more convoys the frequency of sailings could be increased and the over-all effect would be to speed up delivery. The development of transport aircraft with a high pay load and long range would be an important asset in time of war. It would also be a tremendous advantage in time of peace, for, while keeping abreast of the world's cry for speed, valuable lessons in the design and operation of aircraft on our Empire lines would be learned. It may be upon these lessons being correctly learned, and upon the application of the knowledge gained, that the future of the Empire will depend.

THE EMPIRE—DEFENSIVE

"It is not possible to conduct successful offensive operations on land against an enemy with a superior air force, other things being equal."—
FIELD-MARSHAL MONTGOMERY.

The security of communications must loom large in any consideration of the Empire's

defence. If supply lines are cut, then such units as are isolated must be in grave danger. An effective economic blockade could interfere with the Empire's war production to an extent which in some cases would be out of all proportion to the size of the area cut off. We have learned a hard lesson from having a concentrated area of rubber production. The loss of this area to the Japanese imposed a severe strain on our economy. We have to defend, too, against air attack on our industrial areas, and against invasion.

In countering all these threats air power can play an important part. The extent to which an effective air attack on a highly industrialized area can interfere with the war effort of a determined country has been shown only too plainly. The industry of Germany has been pounded out of existence by the combined British and American Air Forces. The vain efforts of the German Air Force to achieve success were due to the defences of Britain and to the German misconception of air power. If they had developed aircraft specially for the role of strategic bombing, the task of defending this country against them would have assumed much greater proportions. It must be assumed that the lessons of these battles will be learned and acted upon by the world Powers. It is essential therefore that the Empire maintains a defence capable of meeting attacks by highly developed air weapons.

The use of pilotless air weapons has introduced a new form of air threat to the Empire. At present, however, they suffer from limitations of accuracy and range. The long distances which these weapons would have to travel to reach the Dominions and Colonies would therefore reduce their efficacy. Development of pilotless weapons might, however, overcome their limitations. But the A.A. guns and fighters mastered the V1 menace, and A.A. Command have announced the development of a means of attacking the V2 during its flight. It is not therefore illogical to assume that the development of defences against pilotless air weapons will proceed along lines parallel to the development of the weapons themselves. Thus, although the threat of attack would still be present, it is unlikely to be a dangerous menace to the Empire if counter-measures are energetically developed. The Empire must look upon the development of these counter-measures as essential to its security.

Some of the Dominions are protected by the sea and some by formidable land barriers. The development of aircraft has changed and is still changing the shape of the world. The natural barriers are changing also. The vast stretches of ocean which formed a barrier to the invasion of New Zealand have now lost much of their signi-

ficance. Air transport and the development of amphibious operations as shown in General MacArthur's Pacific campaign have been the cause of this. There is one factor which is, however, essential to all operations—air superiority. The German Army was unable to invade the British Isles in 1940 because the Luftwaffe failed to gain control of the air. Field-Marshal Montgomery has written:

"The winning of the air battle, and with it the achievement of a favourable air situation . . . is in fact a prerequisite to military success."

Air superiority over the Empire must therefore be one of the keystones of Empire defence. It must range over the northern frontiers of India. over the shores of Australia and New Zealand. over Malta, Canada and Great Britain. Empire air forces must be capable therefore of fighting in many different climates and difficulties. The Empire occupies a quarter of the world's land area. To maintain an air force capable of being uniformly supreme in all these areas at the same time is obviously impossible. But if we have a force which is capable of moving quickly from one area to another as the need arises, the size of that force would present no insuperable problem. Mobility of air power is, then, the key to security.

THE EMPIRE—OFFENSIVE

"Against an army sailing through the clouds neither walls, mountains nor seas could afford security."—Dr. JOHNSON.

Wars can be won only by offensive action. In the Second World War it took the Empire, and in fact the Allies, several years to build up and equip forces capable of mounting a large-scale offensive against the enemy. The geographical difficulties confronting an enemy attacking the Empire must also confront the Empire when it wishes to attack the enemy. As we must retain air supremacy over our own lands to defeat enemy attacks so we must obtain air supremacy over the enemy lands in order that our attacks might be successful. We can gain that supremacy only with air power. We must therefore maintain an Air Force which can strike at the communications, air bases and industrial centres of our adversary. By doing this we can so cripple his air potential that opposition is reduced to a minimum.

The German attempt to obtain mastery of the air in 1940 failed. Because it failed the invasion of Great Britain was impossible even though at that time the land defences of the island were no match in either numbers of men or quantities of equipment for the German military might. It

might well be that the German failure to obtain air supremacy at that time robbed them of world domination.

The success of the Allied invasion of the Continent presents a far different picture. Before the landing the Allied Air Forces had systematically bombed aircraft factories and airfields. By our air offensive the Luftwaffe had been whittled down and its reserves of aircraft and fuel seriously depleted. The task of driving the Allied air fleets from the sky over the beaches and the area inland from them became entirely beyond its capabilities. It was also unable to achieve any success in attempting to stop our advancing armies. Allied aircraft were able to range at will over the enemy forces, destroying communications, delaying supplies, and spreading chaos. Formidable natural obstacles are rapidly losing their significance as the result of air transport development. The crossing of the Rhine, and the carrying of supplies over the "Hump," are only two of the outstanding pieces of evidence which point in this direc-

These examples show that the air arm is the force which must strike first in a major offensive. It is important to the security of the Empire, therefore—for offence is the best defence—that a powerful air arm is maintained. As the size of the Empire prohibits the maintenance of a force capable of defending all points equally at the same time, so it must prohibit the maintenance of a force large enough to take the offensive at all points of the Empire at the same time.

It is neither in the nature nor the policy of the Empire to plan and prepare for attacks against another nation. Thus, at the start of a war, Imperial forces must find themselves without the initiative. But this state of affairs should be of very short duration. Awareness of the situation and study of developments must give indications of impending hostilities. Attacks following a sudden declaration of war, or even—in the modern manner of aggressors—without a declaration, should not catch an alert nation unprepared. If the Empire is prepared for emergencies by having an air force which is highly mobile and can move to threatened areas and be operational in a short space of time, and if its awareness is such that it can concentrate those forces when threatened, then its position in the world will be secure.

The preparedness of the Empire will determine the time required to concentrate its forces and assume the initiative. The time taken to assume the initiative will determine the length of the war. The possession, at the outset, of a mobile, powerful air force must, therefore, be an asset of the utmost importance to the Empire.

THE NEED FOR AIR BASES

"If you cannot hope to control the whole field, it is an advantage to hold such points as give you control of the greater part of it."—JOMINI.

We have seen that the security of the Empire will depend to a large extent upon its ability to concentrate its forces quickly in the decisive area. We have seen, too, that the air forces of the Empire can play a big and indeed vital part not only in offence and defence but also in the transport of troops and supplies. It is imperative, therefore, that the air forces are able to operate at short notice from any part of the Empire.

The mobility of an air force is not related solely to the speed of its aircraft. Experience has shown that lack of suitable landing grounds can render an aircraft inoperative just as effectively as the lack of a tail unit. In the campaign across Cyrenaica and Tripolitania, so much importance was attached to the need for airfields that large numbers of troops were taken out of the fighting line to construct them. The dividends which that policy paid are well known. The Army was never without air support and its advance was never effectively hindered by enemy air power.

The need for air bases was never shown more strongly than in the Norwegian campaign. The Germans had occupied all the Norwegian landing grounds and were able to subject the British troops to the full fury of air attack with almost no opposition. The gallantry of the few British Gladiators was not enough, without the backing of a secure base, to stop the German onslaught.

"German enterprise in securing a chain of airfields in advance had put them in a position to sweep the British out of Norway and to violate all canons of the art of war by maintaining isolated ground forces at points far ahead of their advance."—"MIDDLE EAST, 1940-42," page 63 (Guedalla).

A landing ground alone is not sufficient to permit the operation of aircraft. Refuelling and servicing are absolute esentials, for:

"There is nothing quite so immobile as a grounded aircraft. Until it can refuel, it is militarily non-existent; and unless this takes placewithin range of its objective it is as harmless as a gnat."—"MIDDLE EAST, 1940-42," page 63 (Guedalla).

Air bases with good servicing facilities will enable an air force to move its aircraft from one theatre of operations to another with the greatest ease. The advantages enjoyed by a force with well-organized bases have been shown clearly by Mr. Churchill. Speaking of the reinforcement difficulties of the Royal Air Force in the Middle

East, he said to the House of Commons on 10th June. 1941:

"Anyone can see how great are the German

advantages, and how easy it is to move their air force from one side of Europe to the other. Whenever they need to alight and refuel there are permanent airfields in the highest state of efficiency.

... One has only to compare this process with the sending of aircraft packed in crates, then put on ships ... then taken to Egypt, setting them up again, truing them up and putting them in the air when they arrive, to see that the Germans can do in days what takes us weeks or even more."

Even with good airfields and efficient servicing facilities, the lack of spares and supplies can render the whole organization useless. It is not possible for an aircraft to carry with it spares for its own servicing. The number of items it would have to carry would be so great that its effectiveness as a military weapon would be nullified. The alternative, therefore, is to maintain supplies of spares at places on the routes along which the aircraft will fly. These places must be at, or within easy reach of, the airfields at which the supplies will be required.

The security of the Empire can be maintained by highly mobile forces. The air must play a big part to make these forces mobile. The movement of aircraft is, however, dependent upon three factors which have been discussed. It is essential, therefore, in the Empire's interest to have a chain of bases which can be used by all types of aircraft. The task imposed upon the base is a big one. Let us therefore consider the requirements of a base to discharge its responsibilities.

THE REQUIREMENTS OF AN AIR BASE

"The prophesying business is like writing fugues—it is fatal to everyone save the man of absolute genius."—H. L. MENKEN.

The commitments of an air base are threefold. It must be a point from which aircraft can operate offensively and defensively against the enemy. It must service and maintain these aircraft. It must be a staging post for the aircraft and forces moving to other destinations.

The late war has shown the need for dispersal and defence in depth. An air base must be more than a huge airfield. It will have to be a combination of airfields, workshops and stores depots, dispersed over an area. The British Isles can be looked upon as a large air base. If similar organizations on a smaller scale could be set up throughout the Empire, then the first step to obtaining complete mobility of air power would have been taken. The Navy have already met this need and they have a system of bases throughout the world

in which any ship of the fleet can be refuelled and restocked, and where all but major damage can be repaired.

The first essential of a base is that it must be secure. Unless security is assured it will be impossible to discharge the other responsibilities efficiently. Security means more than the successful defeat of direct attacks. It includes the defeat of attacks made indirectly against the base such as those upon supply lines. The defeat of the German air forces over Britain would have been in vain if the Battle of the Atlantic had been lost. Against the direct threat the base must have adequate fighter protection, signals equipment for its efficient operation, and a good warning system. The indirect threat will make reconnaissance and strike aircraft necessary.

The dependence of a base upon its lines of supply must be reduced to an absolute minimum. By doing this the enemy's chances of neutralizing the base by indirect attacks will be greatly reduced. Local resources should therefore be developed to the full. In addition, factories should be established to turn the locally obtained raw materials into finished articles. It is not suggested that large aircraft factories should be set up wherever an air base is situated. It may be practicable, however, to establish factories to turn out parts standard for all aircraft. These factories could be extended to include repair depots, centres for overhaul and the embodiment of modifications, for the aircraft, and capacity for the manufacture of ground equipment, such as trestles and servicing platforms. These facilities would be a tremendous advantage to the base as a whole.

The primary duty of an air base is the operation of aircraft. A system of up-to-date airfields is essential. Provision must be made for all types of aircraft, for it is not possible to foresee the exact role which an air base might be called upon to perform. Bombers, fighters, reconnaissance and transport aircraft must all be catered for. If large-scale movements of troops are effected by air transport, then barracks will have to be built adjacent to some airfields for their accommodation. Navigational aids, radar screens and all the most modern communications equipment must be installed and maintained at an up-to-date pitch.

Development will add much to the range and efficiency of radar equipment. The aim should be to provide reliable radar facilities so that an aircraft can fly from one base to another in even the worst conditions. By achieving this, one of the worst enemies of aerial mobility, the weather, will have been overcome.

Finally, the bases must be so placed that they are capable of protecting all the interests vital to the Empire. They must also be able to help efficiently to discharge the Empire's obligations to other countries. The location of the bases should be so planned that aircraft of all types can fly from one to the other without having to land at an intermediate post to refuel. The ranges of even fighter aircraft have been increased by the use of long-range tanks, and by careful planning and energetic development this goal should not be unobtainable. The attaining of it would give the Empire an advantage in air communications which must, in peace and in war, enhance its position among the foremost Powers of the world.

Conclusion

It is important that the Empire plans and acts as a whole if it is to retain its position among the major Powers of the world. Harnessing the economic resources of the Empire throws a big strain on the lines of communication. The development of air transport and of industry close to the resources will do much to ease that strain. It will also provide lessons for building up a highly mobile air force which is essential for attacking our enemies wherever they might be, and for defending our communications, factories and homelands against enemy attacks. But aircraft in both peace and war will need air bases. These, established at strategic points throughout the Empire, will be more than large airfields. An air base must have width and depth for security. It must be a smaller edition of the ground organization of England at the present time. Aircraft and air bases are complementary parts of air power. Aircraft, the active partner, will be the half on which the public eye is mainly fixed and it will therefore have good chances of development. It is the Empire's duty to see that the static, but not less important, partner, the air base, is developed to the same extent.

National and Imperial Policy and Air Power

By Flight Lieutenant K. R. Snook

Belligerent Power

THE first principle of government is that a state shall be able to defend itself: "...not stones nor timber nor the art of

building constitute a state; but wherever men are who know how to defend themselves, there is a city and a fortress."

Each nation state possesses problems fundamental and individual to itself: the mountain nation, the seaboard nation, the island nation, each, in its conception of defence, must first assess its natural geographical advantages and disadvantages; for these will ultimately dictate the destiny of that nation. The state which has successfully survived the passage of time, is that which, in the past, has correctly appreciated its position in defence; by its industry has built on its natural advantages, and by its diplomacy and ingenuity overcome its geographical weakness. This is the work of the statesman: his contribution to national solidarity forms a most important factor in the construction and execution of the national policy.

In order to implement national policy, the statesman must integrate the individual ability of his people in industry and in arms. These, when marshalled, constitute the belligerent power of the nation, that is the power to uphold national policy in face of adversity.

Throughout history, the statesman has had to consider each fresh development in society. economy and science and to test the influence of each on national policy. If the influence is inimical, he may arrest its progress, divert its path or provide some satisfactory counter to it; for to neglect that influence may well impair

the future security of the nation.

The progress of the ironclad war vessel and its armament during the nineteenth century can be cited in illustration. Between 1840 and 1900 the statesmen and scientists of Great Britain and France devoted their energies to the real and imaginary problems which this progress inspired. For each nation appreciated the value of the new weapons in relation to their respective national policies and each sought to outstrip the other in achieving invulnerability.

Certain forms of belligerent power can be rejected at an early stage by one nation because they do not affect or appear to affect the national security. History alone can show the wisdom of such action. The Germanic nations, for example, of the nineteenth century rightly took no part in the race for naval supremacy. The British Commonwealth and the United States, on the other hand, wrongly rejected the science of synthetic resins and fuels in the twentieth century. Their natural resources appeared at that time to be abundant, if not superabundant: this neglect might well have proved to be fatal during the Second World War.

The twentieth century, however, has produced the military aeroplane, a form of belligerent power operating, as Cayley describes ... in an uninterrupted navigable ocean that comes to the threshold of every man's door." Here indeed was the weapon to affect the security of every state. It offered mobility and ubiquity to aggressor and non-aggressor alike; it possessed an unfathomed value in offence and defence.

It is now proposed to examine the setting of the stage for air power and to review summarily its influence upon the national and imperial policies of the British Commonwealth and upon the future of international relations.

THE NINETEENTH CENTURY

The nineteenth century is regarded by the historian as the century in which the last traces of feudalism were erased, in which a new era of national and imperial ambition dawned throughout the world. This age of discovery was attributable to philosopher, scientist and statesman: new instruments of state were designed, new sources of industrial power discovered, new or renewed dreams of dominion were dreamed.

During the century, the statesmen of the world, while they might dally with the idea of a grand strategy on land, on sea and in the air, could rarely plan or act in more than one of these dimensions. Lighter than air machines were indeed, in use and were sometimes employed in war. On each occasion they effected little beyond an element of surprise, although certainly over Venice in 1849 they did achieve some measure of civilian terrorization.

These early essays on air power are, however, of more than academic interest, for they presuppose three of the important roles now generally assigned to an air force. In the French revolutionary wars, for example, the balloon had been used as an artillery spotting device in direct support of the French armies. The Austrians, during the Italian war of liberation, employed a smaller automatic version for strategic bombardment of an enemy base. During the siege of Paris in 1870 the balloon was used for transport purposes.

Another feature of the nineteenth century worthy of note in the political conduct of war, is the gradual disintegration of the powers of military authority. During the Napoleonic wars the military commanders-in-chief were each vested with plenipotentiary powers over affairs, military and civil alike. By 1900, however, the complexity of armed operations was such that the commander exercised little control beyond the strategical conduct of his forces. The direction of national activities was vested now in the statesman in council. It was quite clear that, henceforth, the nation with a rigid central authority would possess in war much more than initial advantage. To those nations whose leaders were elected from all ranks of society and thought, there was the danger that national emergency might coincide with the office of a statesman accustomed to examine "all things through the wrong end of a municipal drainpipe.

One other remarkable feature of this period is the industry of the military historian. He succeeded in synthesizing and analysing the fundamental principles of war, which have been mislaid or passed over since the Roman Empire. Military commanders in the past, it is true, had stumbled upon them, but had seldom assigned to them more than moderate tactical values. Now the military historian translated them to the plane of grand strategy and national policy.

BRITISH NATIONAL POLICY

The national policy of Great Britain has been based partly upon her national character and partly upon her geographical position. That policy was primarily to maintain a balance of power in Europe, secondarily to supplement her somewhat meagre natural resources from overseas. In pursuit of the former, she has engaged in many apparently fruitless Continental wars. For the occupation of the 3,000 miles of Northern European coastline by a hostile and over-powerful state, as we know too well, has always constituted a vital threat to her society and her economy. Even at the height of her imperial ambition, this fear has always forced her to keep a watch over her shoulder at the prospective storm centres of Europe.

The secondary aim, to establish overseas rela-

tions, has led her, sometimes by design, more often by accident, to accumulate overseas possessions. Now, the traditional ideal of empire from the Egyptian to the present Japanese, has conceived a circumference of colonies thrown out around the central mother country, operating, as far as possible, on internal lines of communication and presenting a protective wall against the would-be aggressor. No such strategical plan is to be found in the British Empire. whose component parts are scattered piecemeal over the surface of the world. The need for linking the uncoordinated whole has, indeed, resulted in the acquisition of island staging posts, selected primarily for duty as naval bases, and secondly as fortresses against land or maritime invasion.

Thus, the age of air power finds Great Britain well placed to conduct her normal peace-time economy, supported by a confederation of equal Dominion states, by a Colonial Empire and linked by a network of seaways. In war, however, her resources are scattered throughout the world. Strategic concentrations in any theatre cannot be effected except after some delay and at some risk where the enemy threatens her maritime supremacy. To overcome this vital weakness in the European theatre, where danger most frequently threatens, she must have recourse to military alliance. In the past, the principal reference demanded of such an ally was its possession of a land force, capable of rapid mobilization and concentration. Political homogeneity with Great Britain was desirable but by no means essential.

GREAT BRITAIN AND THE FIRST WORLD WAR

It is proposed to treat the world wars of the twentieth century much as the historian regards the French Revolutionary and the Napoleonic wars, as the continued struggle between opposed ideologies. Foch has written:

"Two nations (or sets of nations) professing incompatible philosophies, set out to try them in the light of force and a struggle for immaterial (? non-material) principles can only end when the supporters of one have no means of resistance. An opinion you can argue with, but a conviction only stays put when shot. And the logical outcome of a war of creeds is the final destruction of one."

The war of 1914-18 came to a premature armistice partly because of the exhaustion of the combatants, partly because the victorious nations failed fully to appreciate the true nature of this struggle of "incompatible philosophies." Air power during the war had been restricted

only by lack of technical resources. It had certainly proved itself as an individual arm of the fighting forces. Its future capacity for strategic bombing, for coastal reconnaissance and marine duties, and for long-distance transportation had been acknowledged. The statesman and the military commander now awaited the fruits of technical development to place at their disposal an air weapon capable of these several functions from which the elements of an air strategy could be welded.

Great Britain emerged from the war with a fully fledged and independent weapon in the Royal Air Force. The Empire had appeared from the Peace Treaty swollen with additional commitments in the forms of protectorates and mandates: and the Air Force was to be employed continually during the peace on imperial commitments and on numerous war-

like operations.

British air strategy, poured into the mould of national policy, emerged during these years in the form of a Metropolitan defence force to support the policy of balancing European power, and an Imperial force stretched along the sea routes of the Empire and scattered over the newly created interests of the Levant. The defence force was to be measured in terms of fighter aircraft, for the war had shown that the most successful counter to the threat of air power was air power. Overseas, however, the official history shows that from 1920 onwards the work allotted to the Royal Air Force was such that could only be undertaken by a weapon of offence. The distances to be covered were enormous: domestic financial stringency dictated that there could be no strong concentration of forces in any one area. The principal source of operations was to come not from the rival air power of a hostile nation but from tribal feud and from nomadic ambition. These factors combined to make the long-distance bomber the natural choice for the weapon of offence.

It has been said that the strategic bomber force is a luxury for the modern nation at war, but for the control of the British Empire it has proved to be a political necessity. Not only could this weapon compass the areas involved, it could also effectively root out insurrection and aggression at negligible cost in casualties and money. This mundane fact of financial cost appealed strongly to the post-war statesman. What was formerly required of a garrison force and of expensive and protracted punitive expeditions, could now be undertaken rapidly by a diminutive air contingent.

The work of the Royal Air Force in Iraq,

Arabia, Sudan and Waziristan has done much to establish a case for an International Air Police Force. By the threat or by the act of air bombardment, peace of a kind was imposed over territories which had known no such phenomenon. We may well draw the conclusion that what has been done in the East by a handful of aircraft can be repeated in the post-war world by the concerted efforts and resources of the United Nations.

The adaptation of air power to civil purposes was also undertaken during these years. Internally, civil aviation could offer Great Britain no facilities which were not already catered for, economically and efficiently, by existing transport organizations. Overseas, certainly, there was an increasing need for a swifter means of conveyance and correspondence than that already provided by the shipping network. Imperial possessions offered convenient staging and refuelling posts for an air route to the Far East and the Antipodes. While the Atlantic provided an immediate obstacle to Western exploitation, there was no doubt that technical development would soon overcome this sea barrier of 3,000 miles.

The present generation scorns the slow development of Imperial air transport, contrasting it unfavourably with the achievements of other countries. British operators, however, had to face the competition of the established shipping interests. The post-war shrinking of world trade naturally stirred the shipowner to great efforts in this rivalry. Nor was this entirely the selfish conceit of vested interest, for was not British policy still pinned vitally to her carrying trade?

Nevertheless, the British statesman, since the American War of Independence, has fully appreciated the significance of swift imperial communication. Now, he sponsored the shortlived and disastrous airship enterprise. He subsidised to the best of his ability the newly formed Imperial Airways. Yet he and his electorate were more interested in balancing a precarious economy than in participating in visionary and non-material planning. Britain at this stage could not afford to be air-minded. She lagged behind in the International contest for civil air prestige which was now assuming the proportions of an armament race. However, with what it possessed, Imperial Airways began its operations. Its pioneering activity was beginning to bear hard-won fruits by the end of the twenty years' armistice.

THE BRITISH EMPIRE AND AIR POWER

In the past, British grand strategy had always conceived in terms of two dimensions, that is,



by land and by sea. In 1914 and again in 1939, however, Great Britain entered a war with an ambiguous national aim, with her land forces already committed by treaty obligation to the direction of a Continental power, with her navy independently prosecuting its traditional role of achieving maritime supremacy and of bringing the enemy fleet to action. Now in 1939 she had the additional asset of a small but efficient air force which was destined to assist the land forces and the navy, and to maintain the defence of the realm by air. It has not been shown how the British statesman without offensive action, and having failed signally to select a national aim, intended to prosecute this second world war at all. Nor can be traced any attempt to co-ordinate the striking power of the three armed services, until the German army in 1940 swiftly and unceremoniously ejected the British Expeditionary Forces from the mainland of Europe. Then, at last, with the threat not only to national policy but to her very existence daily increasing, Great Britain and the Empire were compelled to review Imperial grand strategy, for each reverse and failure on land and sea brought fresh significance to the meaning of air power.

The German invasion of Norway showed that "... the intervention of air power denied the heirs of Nelson a new battle of the Nile in the approaches to the Baltic and deprived the British army of a Peninsular war in Scandinavia" (Guedalla). It proved that surface craft could not face the threat from land-based bombers: it demonstrated that air power, like other arms, was dependent upon a secure base, in fact that air forces require airfields in order to operate.

The German advance through Holland, Belgium and France showed that the vision of an air force equipped for defence with fighter aircraft, for offence with bombers, was not comprehensive. In the field there was a pressing need for a tactical weapon which possessed offensive striking power, extreme mobility, and the means of self-protection.

Each new campaign, as the war expanded to East and West, brought new lessons in the re-creation of an air strategy. Not that air strategy differed essentially from that of land or sea: Jomini's dicta that new weapons may affect the practice but not the principles of war, remained true. But the essential problem in these first three years of war was the entire reconception of strategy in terms of three dimensions. "Air warfare," says Guedalla, "had its principles to be planned and rightly operated. . . ." before the youth of the Empire could be committed to the sky.

A survey of the British Empire at the beginning of the year 1942 showed its power to have been at the lowest ebb in three centuries. The sea links between its units were severed in several places, the once secure bases of the Navy were no longer operationally suited to their purpose where shore-based enemy aircraft could attack in force. Each Dominion was denied its accustomed intercommunication and Great Britain herself was being subjected to the daily threat of invasion. If Great Britain had succumbed during this period, the Empire itself would not long have outlived her. Not that the Mother Country claimed or exercised political or economic sovereignty, but the Empire and its strength was so intimately linked with sea communications.

The vulnerability of Great Britain to air attack and, consequently, the threat to the integrity of the British Empire has occasioned the view that these islands can no longer be tenable in future wars. Consequently, it is proposed that the industries, the organizations and the population of these islands should be removed to the hospitable isolation of Canada. Superficially this appears to be an attractive, if somewhat ponderous solution of Imperial strategy. It can, however, be refuted on at least three major grounds. Firstly and economically, Great Britain, under normal conditions, acts as the shop window for Imperial production, in the most important market of the world, Northern Europe. Her natural resources are small, but her organization and production potential are very high. Without this window into Europe, Imperial economy would suffer a material setback. Secondly, on traditional grounds, these islands are the centre for Imperial loyalty; inter-dominion faction might well arise with the selection of one or other country to be the new centre of Empire. Thirdly, on strategic grounds, the evacuation of Great Britain does not solve the long-term problem of future wars. For an Empire centre situated 4,000 miles from European aggression may enjoy temporary sanctuary and immunity. Yet, with the development of new forms of long-distance warfare, that centre may soon fall within the range of hostile air attack. Great Britain cannot be relinquished as the seat of Empire, and Imperial strategy, revised in the light of air power, must acknowledge that fact. Further, the Empire in general, and the British Isles in particular, must continue to depend for its livelihood upon sea communications for the transport of its main requirements in commerce and industry.

Thus, the real problem to be faced in the

revision of Imperial policy and strategy is this: that the Empire is extremely vulnerable to air attack: that we rely for the most part upon islands as the main links of communications. where defences must be concentrated, and consequently must offer attractive targets to air bombardment: that our main shipping lanes pass close to shores from which hostile air forces may operate; therefore, we must anticipate the interdiction of our shipping. Can we, then, expect to survive under the determined bombardment of a competent enemy? On the assumption that modern types of aircraft are to be used in offence and defence, the answer is unquestionably No. Therefore, along which lines can Imperial strategy be revised?

Firstly, now that we have concluded a successful war in Europe, the British statesman is in a position to plan without undue regard to foreign political ambition. He can and should insist upon the permanent disarmament of those areas from which this danger threatens.

Secondly, the potential defensive power of the island unit against air attack must be improved. While air power is still dependent upon airfields, the capacity of such a limited area is restricted by the number and the size of its aerodromes. Therefore, it would seem to be necessary to develop an air weapon which, by its mobility, is independent of such bases, as for example by the construction of mobile catapult stages, serviced from underground maintenance reservoirs. Such an organization, linked with improved radar and A.A. defence technique, should provide a formidable obstacle to the aggressor nation of the future.

Thirdly, the slow-moving merchant ship must be protected. For, in spite of the development of transport aircraft, the ship will remain for many years the means for the transportation of bulk loads. This war has seen the introduction of many and varied methods of attacking shipping from the air, and with them is the prospect of even more formidable anti-shipping weapons, such as the homing rocket and torpedo. Each of these presents a formidable problem in itself, and until they are decided the prospect of defending shipping will remain a serious weakness in Imperial planning. Comfort can be derived from the dictum that no offensive weapon has yet been perfected which has not itself suggested a satisfactory antidote. What must not be forgotten in the future is that, in order to provide both the power of offence and defence, the State must provide the means of research, and the encouragement to Science to attract it to the cause of the nation.

While this war has produced many examples

of excellent tactical and strategical planning, it must be appreciated that planning in each phase of the war has been piecemeal. As each new threat has materialized, as war has flared up in each theatre, so each individual problem has been tackled, without being co-ordinated within a master strategical plan. It is urged that the immediate requirement of the Empire is the definition of future Imperial policy and the reorientation of Imperial grand strategy in the light of probable trends of the air weapon.

The suggestion has been made that a Commonwealth Air Force should be created to share the tasks formerly undertaken by the Royal Air Force. Each Dominion would be responsible for the provision of a contingent from its individual forces, and for the surveillance of Empire interests within a defined sphere. The contingents would be interchangeable, thus to obtain the equitable distribution of duties, to provide a minimum standard of training and to ensure the pooling of research, organization and administration. The scheme offers social as well as political advantages: it should go far towards retaining the comradeship in arms fostered between the independent Dominions' forces during the present war.

It would be impossible thus to integrate the armed forces of the Empire without also a sound economic interdependence. In this sphere again air power must provide the means of reopening the exchange of Imperial wealth. The foundations for Empire air transport have already been laid. What is now required is a comprehensive inter-Dominions organization to provide a regular and efficient service for all types of air traffic. It is generally agreed that such service can only operate economically if competition is avoided: the type of controlling authority envisaged is an Imperial air board, representative of and directed in the interests of every member. Each individual Dominion would be responsible for the internal direction

vision of feeder routes to terminal Imperial airports.

Much has yet to be done to develop the internal air-routes of the Empire. Particularly is this true in Great Britain, where geography, existing communications and the unplanned development of industry and towns militate against efficient inland airways. The view was

and development of air routes and for the pro-

against efficient inland airways. The view was recently expressed by the L.C.C. town planning authority that the idea of a central Metropolitan airport must be rejected on social grounds. It would appear that air transport to London must terminate on the fringe of its ever-spreading suburbs and that the traveller to the city must

lose the time gained from a cross-country flight by a slow and hazardous journey by road from the airport to the Metropolis. There is, however, the prospect of redistributing Britain's industries and commerce and of the exploitation of new areas and sources of power in the Highlands and West of England. Provision must, therefore, be made for extensive air transport facilities in this projected reconstruction. The future political and economic stability of the British Empire in the age of air power is therefore dependent upon these major factors:

- (a) The reorientation of Imperial defence policy.
- (b) The pooling of Imperial air defence resources.
- (c) The establishment of a comprehensive and efficient air transport system.

These desiderata cannot be achieved without considerable sacrifice and ingenuity by the states involved, and the consciousness of air power, awakened during this war, must be maintained among all the peoples of the Empire.

INTERNATIONAL RELATIONS AND AIR POWER

Air power has made the world more nearly a neighbourhood. In the past decade its influence has been concentrated almost entirely upon destruction. It has given the aggressor nation a weapon with which a vital blow can be struck against an unsuspecting victim, without the preliminaries of ultimata or declarations of war, thereby crippling his power of resistance and retaliation. Indeed, the prospect of waging war without the initial formalities is an attractive one, which no amount of international convention can ever extirpate. Nor can the non-aggressive nation undertake to remain in a perpetual state of mobilization, without seriously weakening its own social structure.

The idea of collective security is, at present, too closely associated with the recent failures of the League of Nations. Yet history can provide examples where such a security, backed by an international armed force, has maintained a period of peace. The Treaty of Vienna, 1815, and the Holy Alliance produced a cosmopolitan army which, for good or evil, enforced European peace for thirty years. Air power in the form of an International Air Police Force can offer a refinement to the reactionary hosts of Metternich. Exercised by an enlightened central authority, and aided by an impartial system of international justice, it could fulfil for the world the task wrought by the Royal Air Force during the inter-war period in the Near East. Its constitution at the present time seems to present many political difficulties, none of them insuperable. The Viscount Trenchard has produced a simple but engaging proposal which should lay the foundations for such a force. He considers that each national air force should make provision for the informal reception and accommodation of visiting units from other nations. This scheme, if undertaken, could be used to maintain very close relationship between the operational members and units of the force and would do much to smooth out the international political problems. A clear warning should be given to the world by the United Nations that, if collective security, backed by adequate armed force, cannot be achieved, then there can be little future prospect of restoring its peoples to "the pursuit of happiness."

The second problem of air power which now faces the world is the future of its commercial aviation. In the past, individual nations insisted upon retaining absolute right of passage through their own air. Prohibited flying zones forced the civilian operator to fly along corridors delimited neither for commercial prospects nor for flying safety. Inter-airways competition created national rivalry; unplanned and uneconomical routing and operating resulted generally in each State footing the bill with subsidies. The International Air Convention has done little up to the present to provide bases for agreement. Until agreement can be reached, however, the sound planning and reasoned design of international air traffic cannot begin. It is therefore suggested that the first stage in development must be the establishment of a permanent Air Council charged with the redrafting of International Air Law, with the apportionment of carrying capacity between contributor states, with the survey of prospective world air routes and with the creation of air centres from which commercial operation can begin.

Such a scheme is at present far in advance of national political thought. Many superficial objections can be opposed to it. Would not the progressive nation, for example, be unfairly handicapped by international apportionment? Would not future development be cramped by bureaucratic control? How could the British Empire, with its particular need for trans-continental communication, be dove-tailed into a world airways organization without losing all or part of its political and economic integrity?

Such objections have been raised in the past and have already succeeded in sabotaging the well-meaning Chicago air conference. Their solution is not to be achieved immediately merely by the assembly of national delegates. The widening of political outlook throughout the world is a first necessity and there are already hopeful signs that the hyper-national conscience, legacy of the nineteenth century, is being sloughed off. To what extent air power, which has bridged and narrowed ocean and continent alike, which has placed the Antipodes at our door, will stimulate the era of international co-operation can at last be foreshadowed dimly.

R.A.F. and W.A.A.F. Review of the Year—1945

THE work of the various Home and Overseas Commands of the Royal Air Force, and of the Women's Auxiliary Air Force, has altered considerably since the end of hostilities in Europe. From V-E Day, and more particularly from V-J Day to the close of the year, all Commands have faced the gradual change-over from war to peace in conditions which in some cases have meant a considerable falling off in activity, and in others a marked increase in the work to be done. These contrasting conditions will continue into 1946 and until the task of assisting and speeding up the return and demobilization of our armed forces is completed, and the Service itself has got back to a peace-time basis.

After V-E Day, almost every part of the Royal Air Force prepared to re-deploy a proportion of its strength for the final struggles in the Far East. But great things had already been achieved by Allied air power in South-East Asia Command, and much of the proposed re-deployment proved unnecessary. The supply of an army was carried out on a scale never before attempted. Over 600,000 tons of supplies were carried in the year for the use of the 14th Army, 77,000 tons in April alone. In their four-month, 500-mile advance to Rangoon our ground forces were supplied by air alone every inch of the way. Whole divisions and their equipment were lifted; petrol, food, ammumedical supplies—everything dropped so that the previously unbeaten mobility of the Japanese could be outwitted. The Japanese Air Force was so effectively whipped that long before V-J Day not a single enemy aircraft was based in Burma. R.A.F. fighters and fighter-bombers struck again and again in the worst monsoon weather in the battle for Sittang in June and July. R.A.F. Liberators and Sunderlands of the Indian Ocean Air Force, based in Bengal, had so completely wrecked enemy sea and rail communications south of Rangoon and Bangkok that the Japanese were virtually stranded in Singapore. Liberators based in Ceylon flew

over 1,600 miles of sea to drop supplies and paratroop reinforcements to the guer.lla army that was being built up in Malaya.

A British Commonwealth bomber force was ready to co-operate with the Americans in a day-and-night bombing offensive off the Japanese mainland, while the troop-carrying aircraft stood by for the invasion of Malaya. The sudden collapse of Japan put an end to these plans, but it did not end the R.A.F.'s work in the Far East. On August 29th, Liberators, Sunderlands and Dakotas began one of the greatest mercy missions of the war-dropping first liberation leaflets and then Red Cross supplies of food and clothing to a hundred thousand prisoners of war scattered in camps from Saigon to Singapore, from Bangkok to Sumatra. In less than a week over a thousand prisoners were being flown out from Bangkok every day. 7,500 prisoners of war were flown from the East Indies to Singapore or home to Australia in a month. In less than three weeks 18,000 men were flown from their prison camps on the first stage of their journey home.

To-day, at the close of 1945, R.A.F. Mosquitos and Thunderbolts are in action in Java. Victory year has been a hard, tough year in S.E.A.C., but the R.A.F.'s part in the defeat of Japan is worthily summed up by the Supreme Commander: "Without victory in the air, there could have been no ground success."

could have been no ground success."

In Europe the 2nd Tactical Air Force brought its brief and spectacular career to a close by hammering the enemy wherever he could be found in the first four months of 1945. T.A.F.'s fighters and fighter bombers flew just under 90,000 sorties in these four months, and did magnificent work in paving the way for the Reichswald Forest offensive and later for the crossing of the Rhine by smashing all forms of enemy communications and all attempts by the enemy to concentrate his forces. In the last five days before the German surrender, T.A.F. staged its most concentrated "blitz" on the enemy remnants trapped in the northern pocket: 4,500 transport vehicles and

300 enemy aircraft were destroyed, and well over 200 ships of all sizes attempting to escape to Norway were immobilized by T.A.Fs. bombs and rockets.

After the German surrender, 2nd T.A.F. ceased to exist in name, though many of its personnel continued to serve with its successor. B.A.F.O. (British Forces of Occupation). B.A.F.O.'s task throughout the latter half of 1945 has been twofold: to undertake air policing duties in the British Zone of Occupation. and to carry out the disarmament of the Luftwaffe and the disbanding of the German aircraft industry. Five thousand officers and men have been engaged in "liquidating the Luftwaffe": an enormous undertaking, since there were in Germany at V-E Day nearly half a million Luftwaffe personnel and a vast quantity of aircraft and equipment. At the end of the year the task was nearly finished. Eighty per cent. of the Luftwaffe personnel had been discharged and sent home. Thousands of tons of explosives had been destroyed. A huge amount of equipment had been collected and stored in three Air Disarmament Disposal Camps in Germany. B.A.F.O.'s disarmament teams in Belgium, Holland and Denmark had finished their work apart from a certain amount of bomb disposal to be done; in Norway the task was completed, and our forces had been with-

Meanwhile Gatow airport in Berlin has become an important Transport Command terminal for the Croydon-Hamburg-Berlin and Croydon-Berlin-Warsaw air routes, and over 10,000 passengers have been carried in safety since these routes started running. The first of a number of permanent airfields in Germany was built at Buckeburg in eight weeks by the R.A.F.'s Airfield Construction Service.

Up to May, 1945, Mediterranean and Middle East Command flew nearly 80,000 sorties and dropped approximately 30,000 tons of bombs on enemy targets. The limelight fell mainly on Bomber Command's attacks from bases in Britain and on 2nd Tactical Air Force's operations on the Continent, but all the time MEDME were also dealing out heavy blows from their corner of Europe. After V-E Day the year was naturally uneventful in the vast area covered by this Command, but much work was done in disarming the sorry remnants of the Italian Air Force, in policing and garrisoning, and in setting up and manning the staging posts necessary for Transport Command's huge trooping commitments.

At home the work of R.A.F. Transport Command was increased, not diminished, with the end of hostilities. The Command's last great operation before the German surrender was in support of the Rhine crossings; having towed great fleets of gliders through heavy flak, the Dakotas resumed their normal freight-carrying and casualty evacuation duties. After V-E Day thousands of prisoners of war were flown home from Europe: new scheduled services were set up to centres recently liberated from the Germans, and at the same time the Command's forces had to be re-deployed for the final allout effort expected against Japan. Two staging posts, two casualty evacuation centres, and an independent Wing Headquarters were prepared in Britain to service the British Commonwealth bomber force being got ready to attack Japan. The sudden end of the war against Japan made it unnecessary to despatch this force, but it did not end Transport Command's commitments in the Far East. Again the prisoners of war and the wounded had to be brought home—a much more hazardous task than that just completed in Europe, since the aircraft had to fly great distances over atrocious country and in the worst of the monsoon period. A through service for wounded was quickly set up via Karachi, India, Shaibah on the Persian Gulf. Lydda in Palestine, and Castel Benite in Tripoli. From each of these centres wounded men were flown direct to the Command's Casualty Air Evacuation Centre in Gloucestershire. The wounded were Transport Command's priority traffic, but by October the two-way trooping programme between the United Kingdom and the Far East was getting into its stride. Ten thousand troops were flown east during that month, some to stand by in case of trouble in the Levant, the majority to replace men due for repatriation or demobilization. This twoway traffic continued throughout the year and will go on until Transport Command's share in the task of bringing the men home for release has been completed.

Bomber Command continued its attacks on Germany's war industry until almost the moment that the surrender documents were signed at Luneberg. The Command's first attack of the war was against a naval target off Wilhelmshaven on 4th September, 1939; almost the last attack was again a naval target and in the same area, when the Admiral Scheer was sunk at Kiel in April, 1945. Between these two dates the Command carried out nearly 400,000 sorties, dropped 988,000 tons of bombs and mines, and lost over nine thousand aircraft. There was certainly no slackening of the onslaught in the first few months of 1945, when 181,000 tons of bombs fell on German targets—and 700 more

Bomber Command crews were shot down. Since the end of hostilities many of the Command's stations and personnel have been transferred to other Commands, but our bombers have also played a great part in the two-way trooping programme between this country and the Mediterranean. Six thousand sorties have been flown on this work and a total of 70,000 passengers carried. Ground staff and W.A.A.F. personnel, who did important work behind the scenes in the bombing offensive, have been taken on a series of conducted tours during training flights over the main industrial areas of Western Germany—to see for themselves in peace what was accomplished by their Command in war.

As soon as the war in Europe was over, Fighter Command, who had been operating over the Continent in support of our bomber forces, stepped up the training of aircrew who were expected to be sent to augment our fighter forces in the Far East. There was no longer the need for a large-scale fighter defence of our own country, but only a very small proportion of the Command's personnel became redundant because of this; the great majority were involved in an intensive training programme with Far East conditions as its main theme. When the war with Japan ended, this training programme was readjusted and considerably cut down, but a considerable Operational Training programme has been maintained, partly to train the younger men who are taking the place of personnel leaving the Service, and partly to send replacements or additions overseas. Many of these men are still fighting or patrolling and garrisoning in Java, Malaya, Burma, French Indo-China and elsewhere.

Coastal Command, like Bomber Command, has shrunk in size since V-E Day, and many of its airfields and personnel have been transferred to Transport Command. But on its own account the Command has played an important part in the work of air trooping-especially by reconnaissance landplanes and flying-boat squadrons bringing home men due for release from such bases as Iceland and the Azores, where shipping facilities are inadequate. The Meteorological Squadrons still fly thousands of miles in all weathers every day from the Arctic to the Azores to record data from which our weather forecasts are produced. The Command's Photographic Reconnaissance Squadrons are undertaking a new task: a vast survey of many parts of the British Isles to provide information for, among other bodies, the Ministry of Town and Country Planning in their work of reconstruction. And all the time training of new aircrew continues.

Maintenance Command is another part of the R.A.F. whose work has increased with the end of hostilities. In the first half of 1945 it was the Command's responsibility to supply and issue the R.A.F. with its enormous war needs in equipment. Now the situation is reversed, and the Command is receiving, storing and disposing of the huge quantities of equipment no longer needed. One hundred and fifty airfields and Balloon Centres which are no longer operational have been taken over for storage purposes. In spite of the tremendous intake of surplus equipment, over two million square feet of factory space previously occupied by the Command have been vacated by the end of 1945.

Work went on in Flying Training Command and Technical Training Command without a break throughout 1945, and even after the end of hostilities several new training establishments had been opened largely due to the cessation of the Empire Air Training Scheme. Aircrew prisoners of war returning to this country were put through special courses to accustom them once again to the handling of aircraft. Peace-time pilots are being trained. Men from France, Belgium, Holland and Denmark are undergoing courses of instruction at Flying Training Command establishments. The Mountain Rescue Service, which did such valuable work in rescuing aircrew who had crashed in isolated mountainous districts, carries on with its work.

In all Commands, at home or overseas, the Women's Auxiliary Air Force have carried on the magnificent work they did in war to the difficult changeover period of the first months of peace. In many cases work has increased due to the release of married W.A.A.F. personnel and the fact that the W.A.A.F. are taking over duties previously carried out by men who have now left the Service. The releases themselves, and the intake of surplus equipment, have meant a great increase in work, esspecially for W.A.A.F. equipment assistants, cookhouse staffs, and those in clerical trades. Like many airmen, the W.A.A.F. are keenly welcoming the opportunities for Educational and Vocational Training, and on most stations there are well-attended classes in domestic science, dressmaking and commercial subjects.

1945, in fact, has been for the R.A.F. and the W.A.A.F. not only a year of victory, but also a year of difficulties and changed conditions in the switch-over from war to peace. The difficulties have been overcome. Apart

from the great things which were achieved operationally before V-J Day, the Service has accomplished much in the first months of peace. It has brought home many thousands of prisoners, of wounded, of men awaiting release. It has disarmed and disbanded the greater part of the enemy air forces which it defeated. It has set about the great task of converting

itself from a war-time basis to a peace-time one. Much progress has been made in all these tasks, but they are not yet finished. Until they are finished, the men and women of the R.A.F. and W.A.A.F.—fitters, riggers, mechanics, clerks, cooks, equipment assistants, and the rest—are doing as important work in peace as they ever did in war.

White Paper on Post-War Pay, Allowances and Service Pensions and Gratuities

FOR MEMBERS OF THE FORCES BELOW OFFICER RANK

I.—GENERAL

THIS White Paper is chiefly concerned with the post-war arrangements for the pay, marriage allowance and service pensions and gratuities for ratings and other ranks, though some of the incidental matter touches also upon officers. The arrangements to be made for officers are also being comprehensively reviewed and will be announced later. The new rates of pay and marriage allowances will come into force both for officers and other ranks on 1st July, 1946.

The comprehensive review of the system and rates of remuneration in the Forces has been undertaken primarily for the benefit of postwar regulars in all three Services. The main objects of the review have been:

(i) To simplify the pay systems as much as possible:

(ii) To produce pay codes for the three Services which result in a broad equality of treatment between them, and

- (iii) To fix rates of pay for the Services which will compare reasonably well, on a broad and general basis of comparison, with civilian wages in Government industrial establishments.
- (i) As regards simplicity.
- (a) The Navy will have one scale of pay and increments for length of service which will be common to all branches, instead of having special scales for each separate branch.
- (b) The Army will have a common pay scale in the ranks of corporal and below for all men whether they are tradesmen or non-tradesmen, the progression of both classes being governed by the award of "stars" for qualifications attained. The

- soldier with military skill alone will thus be able to earn the same number of stars and so the same rate of pay as the tradesman with qualifications of equivalent value to the Army. In this way there will now be only four separate rates of pay for privates, including recruits on entry. For sergeants and above there will be two rates of pay, one for the highest skilled group of tradesmen and one for all the rest.
- (c) The R.A.F. will retain the system under which all airmen are allocated to trade groups. The number of groups, however, will be reduced from six to four. In the ranks of corporal and below there will be four separate pay scales, while in the ranks of sergeant and above there will be only two pay scales, one for the highest group and one for all the others.
- (d) The marriage allowance system is also being very greatly simplified (see below).
- (ii) As regards equality of treatment, while there clearly cannot be one uniform pay system into which all the various categories of Service men can be fitted, the three separate pay systems which have been approved will result in a broad equality between men of similar attainments and qualifications whichever Service they join. The rates and conditions of marriage allowance and qualifying allotments will be the same in all three Services, and so will the new scales of pensions and gratuities for service.
- (iii) As regards the comparison with civilian wages, as explained in paragraphs 8 to 15 of the White Paper, it is not possible to establish any close correspondence at all points, but a suitable broad relationship has been established between the man in the basic grades in the

Services and the roughly comparable civilian worker in Government industrial establishments. In arriving at this result various special factors affecting the Service man have been taken into account.

PAY

The present system must continue whereby the Forces are remunerated on the basis of pay plus provision in kind (food, accommodation, clothing, etc.) with a separate marriage allowance in addition to pay for married men. In addition to these factors account must be taken in making any comparison with civilian wages of various expenses to which the serving man is not liable. Taking account of these considerations, and of the other factors referred to above, it has been decided to fix the Service pay of the trained man in the basic grades, say the able seaman or stoker first class, the two-star private or the aircraftman first class in the new Group C, at 42s. a week; this may be taken in the case of the married man receiving marriage allowance as the equivalent of a civilian wage of £5 a week.

The new rates of pay represent a considerable increase, particularly for the fighting man who is not a tradesman, over the present rates of basic pay including the 7s. a week war increase but excluding war service increments. They are very much in advance of the pre-war rates. The recruit on entry, for instance, who received 14s. a week before the war and receives 21s. a week now will in future receive 28s. a week. Similarly, the trained infantry man whose pay before the war was 21s. a week and is now 31s. 6d. a week will receive a rate of pay of 42s. a week. (For representative examples of all three Services see paragraph 16 of the White Paper.)

Some men, for the most part those who have had prolonged war service and are drawing substantial temporary additions to pay in the form of war service increments, will be getting more than the new code provides. Special arrangements are being made for these men.

MARRIAGE ALLOWANCE

The present system of marriage allowance which provides for additions in respect of children (within certain age limits) irrespective of number, will come to an end. However appropriate this arrangement may have been under war conditions when men with several children have had to enter the Services in the junior ranks, the system is unsatisfactory because the resulting allowance in the case of the large families gives the married man in the

Services so very much more than the Service bachelor, and the married man with a small family, for doing the same work. It also becomes more difficult to establish an appropriate relationship between Service remuneration and civilian wages. Under the post-war code, therefore, there will be a flat rate of marriage allowance for all married men of the same rank qualified to receive the allowance. The basic rate will be 35s. a week and there will be higher rates for men of the rank of sergeant and above (and equivalents).

The minimum qualifying allotment for marriage allowance will be 10s. 6d. a week for corporals and below (and equivalents) in place of the present corresponding rates which range from 7s. a week upwards. Sergeants and above (and equivalents) will pay higher rates of qualifying allotment. These qualifying allotments will be paid in addition to the allowance in each case.

Children of Service men will be eligible in common with the children of civilians for the allowances under the provisions of the Family Allowances Act when introduced.

The qualifying age for marriage allowance for men, which was 25 (Navy) or 26 (Army and R.A.F.) before the war, will now be 21. There will be special arrangements for men who may nevertheless get married below the age of 21.

It will not be possible to continue under the post-war code the extra-statutory income tax concession by which marriage allowance and family allowance have in general not been included in the man's taxable income. Such allowances are in effect an addition to the pay of the married man, and they should be taxed (subject to the normal taxation reliefs) like any other wages.

Dependents' allowances and war service grants, which are special war-time emoluments deriving from the introduction of compulsory military service, will not be continued, in conjunction with the new code, for regulars entering direct from civil life. Men who have already entered into regular engagements and in respect of whom a dependant's allowance or war service grant is already in issue on 1st January. 1946, will be allowed provisionally to retain their existing eligibility. Men serving on wartime engagements will continue provisionally to be eligible for new as well as for existing allowances or grants. The necessity for the further continuance of dependants' allowances and war service grants will be reviewed on or before 1st July, 1947, but there will be no general discontinuance before that date. Individual adjustments will be made in the light of the

new rates of pay, allowances and qualifying allotments.

SERVICE PENSIONS AND GRATUITIES

There will be a new basic scale of pension, common to all three Services, for men completing twenty-two years' service, with a higher scale for men completing longer periods. The new scale will in general be more favourable than the 1919 scale, and considerably more favourable than the 1930 scale which would otherwise be payable to all men who have joined on regular engagements in the past fifteen years. There will also be a new scheme of gratuities for men discharged or transferred to the reserve without being eligible for service pension, on completion normally of not less than ten years' service. The maximum gratuity is as high as £200 for fifteen years' service.

AIRMAN AIRCREW

There will be special arrangements for the ranks and pay of airman aircrew in the R.A.F. There will also be a special number of gratuities and service pensions for pilots and navigators.

TREATMENT OF SPECIAL WAR EMOLUMENTS

There are various special war emoluments now payable in addition to pay which cannot be part of a peace-time code. These will be dealt with as follows:

- War Gratuity. Service will continue to reckon for war gratuity for officers and men up to the anniversary of V-J Day, i.e., 15th August, 1946.
- (ii) Post-war Credits. These special credits for men of the Services will cease to accrue from the date of introduction of the new pay code, i.e., 1st July, 1946.
- (iii) War Service Increments. No further war service increments will be granted to officers and men after 1st July, 1946, when service will cease to count for this purpose.
- (iv) Japanese Campaign Pay. Japanese Campaign Pay will need to be reviewed in the light of circumstances, but will be continued in any case for officers and men up to the anniversary of V-J Day, i.e., 15th August, 1946.

APPLICATION TO NAVY, ARMY AND R.A.F.

(i) Pay and Marriage Allowance. The new codes of pay and marriage allowance will come into force on 1st July, 1946, together with the new arrangements to be made for officers,

- (a) Pay. Men whose pay on 30th June, 1946, including war service increments, is in excess of the rates provided in the new code will continue to draw the difference temporarily as an addition to the new rate of pay, this difference being called a "war excess." Such "war excesses" on pay will be reduced by half-yearly instalments, starting on 1st January, 1947. The first instalment will be 3s. 6d. a week and the subsequent instalments 7s. a week each, or such smaller amount as may be necessary to absorb the "war excess." The instalments will be larger in the case of officers.
- (b) Marriage Allowance. Where the total of marriage allowance and qualifying allotment in issue to the family on 30th June, 1946, exceeds the total of marriage allowance allotment under the new code. the total amount in issue under the old code will be continued, subject to the man contributing the new allotment rate in place of the old allotment rate. The total amount will be continued in issue so long as it remains more favourable to the family and so long as the wife and children covered by it remain eligible under the present rules. The excess payment will be reduced if the man becomes eligible for a higher rate of allowance under the new code, or is required to pay a higher rate of qualifying allotment under the new code in consequence of promotion.

These special arrangements for pay and marriage allowance will not apply to men entering on regular engagements after 1st January, 1946, who at the time of doing so are not serving on the active list.

- (ii) Pensions. The new pensions scheme will come into operation immediately, and will apply to all men entering into pensionable engagements after the issue of the White Paper, and also to men who have already been re-engaged for pension at this date (19th December, 1945) if they so elect. It will not apply to pensioners who have already been discharged to pension: the position of such pensioners who have had some minimum period of full-time service in the Armed Forces in the 1939-45 war is under examination.
- (iii) Gratuity. The new gratuity scheme will apply to men entering into regular engagements after the issue of the White Paper and also, if they so elect, to men already serving on regular engagements on the acting list, though

only service given after this date (19th December, 1945) will reckon in these latter cases for the purpose of assessing the amount of the gratuity.

APPLICATION TO OTHER FORCES

This announcement does not cover the Women's Services, boys, British Service Army and R.A.F. personnel on Indian rates of pay and local personnel recruited oversea. All these classes are being dealt with separately.

Provision for Future Review

The new rates of pay and marriage allowance, which have been fixed in the light of current conditions, will be subject to review from time to time, but changes will not be made except in the event of a marked alteration in conditions. If any such changes are made in the future they will apply without exception to men then serving and there will be no reserved rights on a permanent basis for individuals to whom the rates and conditions at the time may be more favourable. There will be no regular provision for the revision of pensions.

II.—Application to the Royal Navy

The separate pay for non-substantive qualifications which is now paid to men specializing in gunnery, torpedo, communications and other duties, will be replaced by a basic rate of pay covering both rank and qualifications. The qualifications for present non-substantive pay will become a part of the standard of proficiency required for advancement.

Special pay will continue for service in sub-

marines and duties in the air.

The new basic weekly rates of 28s. ordinary rate on entry, 35s. ordinary rate trained, 42s. A.B. rate, 52s. 6d. Leading rate, 63s. Petty Officers and 73s. 6d. Chief Petty Officers will apply to ratings of all branches. Trained men serving in Artisan and Artificer branches will, as at present, have higher ratings on entry, thus receiving a higher pay level in relation to length of service than other branches. Trade pay of from 7s. to 14s. a week according to rank will be payable to all Artificer ratings of Acting 4th Class and above, and certificate allowances will continue for Engine-room Artificers. Ratings will be in three groups for pay purposes, Group A (Artificers), Group B (Artisans) and Group C (Seamen and all others not in Groups A and B).

The new incremental system of 2d. a day for A.B. rates and 3d. a day for leading rates and

above, after each two years' service from the age of 18, will provide a steadily mounting addition to pay of from 1s. 2d. a week to a maximum of 7s. a week for A.B. rates, and of 1s. 9d. a week for every two years' service without limit for leading rates and above, the weekly addition for a Petty Officer with, say, twenty years' reckonable service giving ten increments (17s. 6d. a week). Besides providing a substantial addition to basic pay, these increases will do much towards reducing inequalities when variations occur in the time taken by men of different branches or Port Divisions to secure advancement in vacancies.

Good conduct badges and pay will continue on similar principles to the present ones. The conditions have been altered to a uniform rate of award with a higher average of pay, the earning rate being 2s. 4d. a week for each of three badges after four, eight and twelve years.

The new rates for Royal Marines (other ranks) will be generally similar to those for naval ratings. Certain "Hostilities Only" branches such as the Mechanics, and the Naval Air Branch will be dealt with later.

III.—APPLICATION TO ARMY

The new daily rates of pay will be as follows:

		Highest	CLASS	IFICATIO	N	
RANK		Skilled adesman	Three Star	Two Star	One Star	Recruit
Private Private		—	7/-	6/-	5/-	4/-
L./Corporal			7/6	6/6	5/6	
Corporal			9/6	8/6	7/6	_
Sergeant*		12/-		10/6	<u> </u>	_
Staff Sergeant		14/6		12/-	_	
W.O. Class I	I	15/-		13/-		_
W.O. Class 1		17/-	_	15/-		_

* The appointment of Lance-Sergeant will be abolished.

Increments of Pay

An increment of 6d. a day will be granted to all soldiers after the completion of five years and a further increment of 6d. a day after ten years' reckonable service. These increments will take the place of the existing increments for long service and good conduct which will no longer be given.

There will also be an increment of 6d. a day after four years' service in the rank of Corporal; 6d. a day after each four years' period as Sergeant, Staff Sergeant and Warrant Officer Class II; and 1s. 6d. a day after each four years' period as Warrant Officer Class I.

Additional Pay

Additional pay will continue to be granted for certain duties in the air, including para-

chute duties, but otherwise, with minor exceptions, extra pay for special duties and qualifications will be absorbed in the basic rates.

Length of Engagement

It is contemplated that the normal regular engagement will in the future be for five years with the Colours, but extensions to complete twelve years with the Colours will be granted on a more liberal scale than before the war. Men so extended will have the right to reengage to complete a pensionable engagement which, subject to the necessary legislation, will be twenty-two years, and continuance beyond twenty-two years will be permissible in certain cases. Re-enlistment and re-engagement on these terms will not be permitted until authorized by further instructions.

Foreign Service

It is hoped that the normal period of foreign service for men on the first period of their engagement will be reduced to three and a half years at the most, as compared with six to seven years before the war.

IV.—APPLICATION TO THE R.A.F.

Engagements

The standard engagements for ground trades in the post-war air force will be:

Twelve years from the age of 18 for apprentice entrants.

Twelve years for skilled tradesmen.

Five years, with the possibility of extension to twelve, for other entrants.

Re-engagement

There will be a radical change in the policy of re-engagement for ground personnel as compared with pre-war policy in that

- (a) the ratio of re-engagement in the higher groups will be substantially greater, and
- (b) the length of re-engaged service will be increased, provision being made for the introduction of long service engagements up to the age of 50 or 55 according to trade.

Overseas Tour

It is intended to restore the normal pre-war tour of three years (two years in certain commands) as soon as circumstances permit.

Groups

The number of trade groups to which ground personnel are allocated will be reduced from six to four, to be known as Groups A—D.

There will be different rates of pay for each group in the ranks of corporal and aircraftmen. In the higher ranks there will be two rates only, one for Group A and the other for Groups B, C and D.

Special Provisions for Airman Aircrew

A major reorganization in the categories and ranking of airman aircrew will be introduced. (It will not be possible to change over completely to the new scheme with effect from the introduction of the new pay code and special interim arrangements will be necessary for a period.) The main features of the reorganization will be as follows:

- (a) The proportion of aircrew posts filled by officers will be reduced and a correspondingly larger proportion will be filled by airman aircrew, who will, however, be eligible for the grant of commissions. (No appointments will in future be made direct from civil life to short-service commissions for aircrew duties.)
- (b) There will be five main aircrew categories known as Pilots, Navigators, Signallers, Engineers and Gunners.
- (c) Pilots and navigators will in the main be recruited direct from civil life on engagements for five years on the active list followed by four years on the reserve. They will be eligible to be considered for re-engagement to complete twentytwo years' service.
- (d) Signallers, engineers and gunners will be qualified in the maintenance of their equipment and will undertake maintenance and servicing duties on the ground in addition to their duties in the air. They will be selected from airmen qualified in related ground trades in Group A and will serve on aircrew duties for five years, at the end of which they will normally revert to their trade.
- (e) The special position of airman aircrew will be recognized by the institution of a new system of ranks each with its own title and badge. These ranks will be as follows:

Cadet Pilot, Navigator, Signaller, Engineer and Gunner (undertraining).

Pilot, etc., IV.

Pilot, etc., III.

Pilot, etc., II.

Pilot, etc., I.

Master Pilot, etc.

For certain regulational purposes these ranks will be related to conventional

ranks in the ground trades. Master Pilot, for example, will be related to Warrant Officer, Pilot I to Flight Sergeant, Pilot II to Sergeant, and Pilot II and IV to Corporal.

- (f) Provision will also be made for aircrew of a lower degree of technical skill than those recruited from Group A. The special conditions applicable to those categories will be promulgated later.
- (g) Aircrew personnel will be granted the rank of Pilot, etc., IV on award of the flying badge with advancement to Pilot, etc., III, on completion of operational training. Advancement to Pilot, etc., II will normally take place during the fifth and to Pilot, etc., I during the ninth year of aircrew service.

Rates of Pay

The basic rates of pay (weekly) will be as follows:

		GROUP	TRADES	MEN	
	Group A	Group B	Greup C	Group D	Recruit
Aircraftman 2 Aircraftman 1 Leading	45/6 49/-	42/- 45/6	38/6 42/-	35/- 38/6	28/-
Aircraftman Corporal Sergeant	52/6 66/6 84/-	49/- 63/-	45/6 56/- 73 /6	42/- 52/6	
	101/6 119/-		84/- 105/-		

AIRCREW

	Pilot and Navigator	Signaller, Engineer and Gunner
Pilot, etc., IV	73/6	70/-
Pilot, etc., III	87/6	84 / -
Pilot, etc., II	105/-	101 <i> </i> 6
Pilot, etc., I	122/6	119/-
Master Pilot, etc.	140/-	136/6

In addition there will be increments for length of service in the rank at the following rates: 3s. 6d. a week after four years' service as Corporal or Pilot, etc., III; 3s. 6d. a week after each four years' period as Sergeant or Flight Sergeant, Pilot, etc., II, or Pilot, etc., I; and 10s. 6d. a week after each four years' period as Warrant Officer or Master Pilot. Good conduct pay will be granted after five and ten years' reckonable service at the rate of 3s. 6d. a week in each case, making a total addition of 7s. after ten years.

Pension and Gratuity

The arrangements for pension and gratuity will be the same for all three Services and are indicated in para. 12 above.

There are, however, two special provisions

for pilots and navigators, viz.:

(a) There will be an addition to pension which will give pilots and navigators leaving the Service who complete twenty-two years' aircrew service a supplement of 14s. 8d. a week, making a total of 55s. a week in the normal case.

(b) Pilots and navigators will receive a gratuity of £200 on transfer to the reserve on completing five years' service.

SUMMARY

From the R.A.F. point of view the salient features of the revised arrangements set out in the White Paper are apart from improved rates of pay, pensions and gratuities:

(a) Improved prospects of long service for the tradesman with the possibility of

serving to the age of 55.

(b) A revised long-term scheme for the provision of aircrew designed to set high technical standards and to attract good candidates from within the Service and from civil life.

Statement Relating to Defence

(COMMAND PAPER No. 6743)

Statement by the Prime Minister and Minister of Defence to Parliament by Command of His Majesty, February, 1946.

Note:-Sections I (Introductory) and II (1945 In Retrospect) to paragraph 4 inclusive have been omitted.

5. The assessment made in October, on the best information available at that time, showed that we should have to retain in the forces on the 30th June, 1946, 2,233,000 trained men and women. This figure, which was announced on the 3rd October, 1945, was accepted by His Majesty's Government for the time being, subject to review at the end of 1945. To alter the figure would have been unprofitable, because the rate of release up to the end of 1945 was not affected by it. As already explained, this release was governed by physical facts. The fixing of a figure for June, 1946, however, enabled the civil industries to make their provisional plans for expansion.

III.—THE PRESENT SITUATION

6. The months of December, January and February have been spent in an exhaustive review of the situation, so that a firm policy for the year 1946 can be enunciated as a guide to all concerned. This is not the time to come to decisions about the eventual shape of our post-war forces. The great strides made in the realm of science and technology, including the production of atomic bombs, cannot fail to affect the make-up of our forces. Time is wanted for the full effects of these startling developments to be assessed. But in the meanwhile, and for the year 1946, the question of fundamental reorganization does not arise. The tasks which confront our armed forces, and to which further reference is made below. are the tasks of resettlement and pacification tasks which must be fulfilled to the accompaniment of steady but drastic contraction.

7. It is also too early to assess the effect on our defence requirements of the establishment of the United Nations Organization. His Majesty's Government have repeatedly expressed their intention of giving the utmost support to the United Nations Organization in all its activities. As one of the five permanent Members of the Security Council, a special responsibility rests upon the United Kingdom in the maintenance of international peace and security. It will fall to His Majesty's Government to conclude an agreement under Article 43 of the Charter for the provision of forces, facilities, and assistance, to be on call by the Security Council, and to be at a prescribed state of readiness and in certain general locations. The preparation of this agreement will take a certain time. Close touch with the Governments of the Dominions and of India will be maintained on this subject. We feel confident that the contribution of the British Commonwealth and Empire to the maintenance of world security will be worthy of the great cause at stake.

8. On any hypothesis, the total strength of the forces which will still be required at the end of 1946 is larger than we shall permanently require, though the pattern of its distribution between the services may be different from that in which the ultimate post-war distribution will fall. We thus have time, during the period of abnormal commitments, in which to shape our long-term plans. His Majesty's Government have, therefore, concentrated upon a careful review of the forces by sea, land, and air, which will be required to meet the tasks of 1946, and of the scale of equipment to be provided for their use.

9. The commitments with which we are now confronted, and which we are bound to under-

take, can be summarized as follows:

(a) The provision of our share of the forces to ensure the execution by Germany and Japan of the terms of surrender.

The task in Germany involves the presence of adequate naval, land, and air forces to occupy effectively the British zone, and the British sector in Berlin, to carry out the disarmament and demilitarization of Germany within our zone, to deal with prisoners of war, and to assist in the repatriation of displaced persons, and to provide striking forces in case of trouble. The size of these forces is being reduced, though they cannot be dangerously weakened, and the organization of the Army and Air formations in Germany is being adjusted to suit the occupational role which they have to fulfil.

The task in Japan has been very largely assumed by the forces of the United States, but we are providing a small contingent which forms part of a British Commonwealth force.

(b) The provision of our share of the forces for the occupation of Austria.

It is our desire to reduce these forces as quickly as possible to very small proportions, and we are in consultation with the other three occupying Powers to this end. (c) The provision of forces to maintain law and order in Venezia Giulia.

This task, which is shared with the United States, will be brought to an end when a final settlement is reached in the Peace Treaty with Italy.

(d) The provision of forces to assist the Greek nation in its recovery.

The policy of His Majesty's Government in Greece has been made clear to the world. British forces in Greece will remain until elections have taken place and conditions there allow of their withdrawal.

(e) The provision of forces to enable us to carry out our responsibilities in Palestine.

His Majesty's Government are responsible for the administration of Palestine. It is to be hoped that an equitable solution of the political issues at stake in that country will shortly be found, but in the meantime the preservation of law and order makes heavy demands upon our resources.

(f) The liquidation of the Japanese occupation of Allied territories in South-East Asia.

The task of disarming and collecting the Japanese forces scattered throughout this great area is steadily being accomplished. The civil administration of British territories is gradually being restored, and conditions are being created for an equitable settlement of the difficult political issues in the Netherlands East Indies. Much work devolves upon the armed forces, who alone have the organization and resources required to bring order out of chaos in territories ravaged by the Japanese, but it is the hope of His Majesty's Government that in the course of the year peaceful conditions will be re-established, thus enabling the greater part of our forces to be withdrawn.

(g) The maintenance of internal security and settled conditions throughout the Empire.

It has already proved possible to reduce many of our garrisons to the peace-time scale.

(h) The safeguarding of our communications and the upkeep of our bases.

This is essential for the efficiency and mobility of our forces by sea, land, and air.

IV.—The Strength of the Forces in 1946

10. In addition to the above, there are a number of considerations which have a bearing upon the rate at which the reduction in the size of the forces can be carried out. The object of His Majesty's Government is to secure the release from the forces of those who have borne the heat and burden of the day. For this reason the call-up

of young men must continue. At the same time, care must be taken not to impair more than can be avoided the efficiency of those forces who still have active tasks to fulfil all over the world. The progressive removal of large numbers of the experienced and the skilled, which results from the age and service release scheme, places a very heavy strain upon the organization of the Services, and a great effort is called for in the training of replacements, and in the retraining of men and women with some time still to serve, so that the gaps in active formations can be filled. The progress of demobilization, and the movement of replacements, call for a continuous and largescale programme of transportation. To supplement our shipping resources, it has been necessary for the Navy and Royal Air Force to carry as many men to and fro as could be done with safety and without prejudice to the execution of our major responsibilities. Many aircraft carriers and large warships are employed in this way and the task is not finished. Transport Command, R.A.F., in circumstances of great difficulty, and supplemented by a part of Bomber Command. have been conveying substantial numbers. At the peak period, movement by air on the Eastern route reached the figure of 9,000 a month in each direction. Owing to the effect of the release programme on Transport Command this figure could not be maintained. As demobilization proceeds still further the air trooping programme must inevitably be brought to a close. This factor has been fully taken into account in our demobilization plans.

11. There are two further tasks which should be mentioned, which still make considerable calls upon our man-power. The first is minesweeping. The Royal Navy have been playing a major part in this work, which is organized on an international basis, and which is essential for the restoration of world trade. It is hoped that this commitment will be nearly liquidated by the end of 1946. The second is the task of disposing of surplus material of all kinds. A considerable amount of Lend-Lease material has had to be kept in good condition for return to the United States. Great efforts are being made to accelerate the disposal of surplus stores of all kinds, but in the meanwhile it is necessary to store and guard valuable dumps, which would otherwise be subiect to deterioration and loss.

12. The tasks which have been summarized above have been carefully and fully reviewed, with the object of determining the role to be played by each Service, and the extent to which the task of one can be relieved by judicious use of the resources of the others. Financial and manpower considerations arising from the equally im-



portant claims of our economic situation inevitably impose limitations. His Majesty's Government, after weighing up all the factors, have drawn up a programme of demobilization for 1946 which is founded upon the reasonable expectation that a number of abnormal commitments will be entirely liquidated in the course of the year, and that unforeseen events do not disturb the course of progress towards settled peace.

The total strengths of trained men in the three Services at which this programme aims are:

On the 30th June, 1946 ... 1,900,000 On the 31st December, 1946 1,100,000

to which fall to be added 100,000 men under training.

It must be reiterated that the achievement of these target figures depends upon the development of events and upon the successful settlement of many problems left over from the war. It will be noted that the figure for the 30th June, 1946, represents a reduction of 333,000 from the estimate published last October. If the figures for December are achieved, the reduction in the strength of the forces in the eighteen months from the beginning of demobilization in June, 1945, will be approximately 3,900,000 men and women, or over 75 per cent.

- 13. His Majesty's Government intend to continue demobilization in accordance with the age and service release scheme and, without prejudice to any final decision which may be taken in due course about a permanent system of national service, to continue for the present the call-up of young men under the National Service Act. They fully recognize, however, that it is necessary as soon as possible to fix a definite period for the length of engagement of new entrants to the forces. Much will depend upon the rate of entry of volunteers for the Regular forces, and upon the progress of events; but, as soon as the position can be more closely gauged, His Majesty's Government intend to announce that from a given date all new entrants under the National Service Act shall be called up for a definite period, and to say what that period will be. It will then be the aim of His Majesty's Government to demobilize as rapidly as possible—though this will necessarily take some time—all those in the Services who on the given date will have served for longer than the period fixed for new entrants.
- 14. His Majesty's Government are also considering the measures required for the re-establishment of reserve and auxiliary forces, with which would be associated the Cadet Corps and appropriate training organizations at certain Universities.

V.—Supply of Equipment

- 15. Equally important with the reduction of the size of the forces is the reduction in the manpower employed on work for the forces. His Majesty's Government have reviewed the policy for the provision of equipment in the present abnormal circumstances. They propose to be guided by the following four principles:
 - (a) Concentration on research. Scientific and technical progress at the present time is so rapid that safety lies far more in the maintenance of an adequate organization for pure and applied research than in the building up of stocks of obsolescent equipment.
 - (b) Limited introduction of equipment of the most modern kind, e.g., jet-propelled aircraft.
 - (c) The maximum use of accumulated stocks.
 - (d) The maintenance of a reasonable war potential.
- 16. It is the view of His Majesty's Government that a severe reduction in the output of weapons and equipment for the forces is essential not only in the interests of our economic recovery but also to avoid the accumulation of obsolescent munitions. They have accordingly imposed financial and man-power ceilings on production programmes, and they have set as the man-power ceiling for the 31st December, 1946, a figure of 500,000 to cover naval shipbuilding, aircraft production, and the production of weapons, stores, equipment, clothing, etc. If this ceiling is achieved it will mean in the eighteen months since June, 1945, a reduction in supply and equipment labour of 3,387,000 men and women, or 87 per cent.
- 17. Taking the aggregate of men and women in the Services and employed on work for the Services, the total reduction in the eighteen months ending December, 1946, would be 7,280,000, or 81 per cent.

VI.—FINANCE

18. The financial provision required for the Service Departments and the Ministry of Supply in 1946 reflects the transitional nature of the year. The rate of expenditure on the maintenance of the forces and on the production of supplies for them will steadily diminish as man-power in the forces and in the munitions industry is reduced. The total requirement for the year for these purposes will therefore be considerably higher than the level to which it will have been reduced at the end of the year. The expenditure in the year will be further swollen by the large terminal charges which are an inescapable accompaniment of the cutting down of commitments. There are war

gratuities and other payments to be made at the end of service. There are charges on the termination of contracts and payments for the winding up of closed contracts. Besides these items, there is compensation for damage on the termination of requisitions of land and property. All these payments conceal the true figure at which current Service and Supply expenditure is actually being incurred on the day-to-day running of the Services.

19. The total provision included in the Estimates is as follows:

				£	: million.
Navy					255
Army					682
Air					256
Supply	and	Aircraft	Produ	ction	474
11-7				_	

£1.667 m.

£1.091 m.

Of this sum, the terminal charges mentioned in the preceding paragraph amount to £576 million, leaving a sum of £1,091 million as the amount required for current Service and Supply expenditure on the day-to-day running of the Services.

20. This latter sum is distributed between broad categories of expenditure as follows, in round figures:

Pay, rations, etc., of Service personnel 580
Production 230
Works (including maintenance) 75
Non-effective charges ... 25
Miscellaneous (net) ... 181

VII.—HIGHER DEFENCE ORGANIZATION

21. Reference has already been made to the development which has taken place during the war in the central machinery for the control of our war effort. The assumption by the late Prime Minister of the position of Minister of Defence, and the operation of Joint Staffs in an expanding field of activity, were the principal features of this development. There was no formal change in constitutional responsibility, though under the impulse of war the rigid boundaries of departmental authority were modified in the interests of centralized control. His Majesty's Government felt it desirable, soon after the end of the war, to review the position, and to formulate proposals for a higher defence organization which would embody the improvements suggested by the experience of the last six years. It is hoped before long to lay before Parliament concrete proposals.

22. In the meanwhile, the full measure of coordination of the Services attained during the war has not been allowed to relax. Not only in the field of plans and intelligence but in matters of general administration and in problems of manpower, the work is on a fully combined basis not only between the Services but also between military and civil staffs.

VIII.—Collaboration with the Dominions in Defence

23. During the war, collaboration with the Dominions and India has been comprehensive, continuous, and effective. The long-accepted principle whereby His Majesty's Forces throughout the Empire have been trained, organized, and equipped on the same basis, proved its value in the easy and whole-hearted co-operation which took place by sea, land, and air, in all theatres of war, between men and women of many races. Behind the forces, collaboration in the field of scientific and technical development, and in the production of munitions and supplies of all kinds, was equally close and thorough. His Majesty's Government in the United Kingdom acknowledge to the full the tremendous efforts put forward in the common cause by the whole Commonwealth and Empire, and earnestly desire to continue in peace the full partnership so magnificently established in war. It will be necessary to consider with the Governments of His Maiesty's Dominions and India the way in which the lessons of the war can be applied to promote consultation and collaboration in defence matters during peace.

Book Notices

GEOGRAPHY OF AN AIR AGE. By E. G. R. Taylor. 55 pp.
(Royal Institute of International Affairs; 1s. net.)

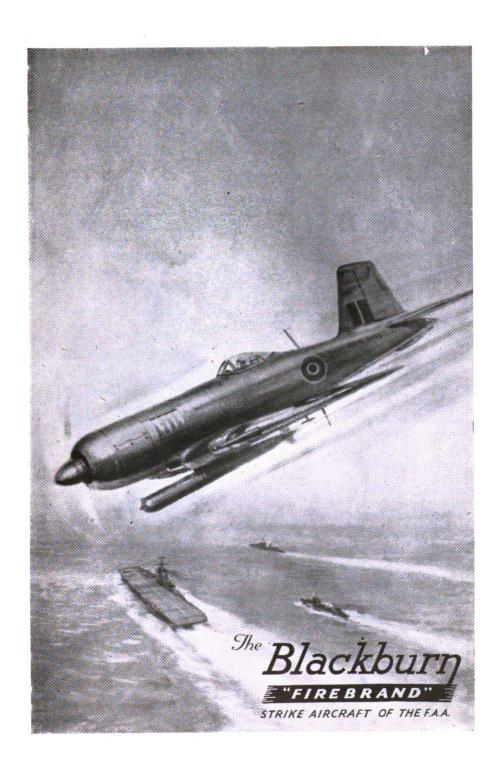
This pamphlet starts out to show how modern aeroplanes have rendered Mercator's Projection and our familiar "flat" maps out of date, and the necessity now for studying geography in global form. The airman is, of course, familiar with the advantages and disadvantages of Mercator navigationally, but this book is more concerned with the necessity for a new conception in geography—we can no longer regard the earth as a flat surface "whereon east and west are widely separated," and where "there is nothing beyond the poles." Long-disance flights using trans-polar and Great Circle routes generally are fully discussed, and the drawbacks to many of these routes examined, taking into consideration the effects of weather, the "pull" of centres of population and the position of the major world focal points

generally are fully discussed, and the drawbacks to many of these routes examined, taking into consideration the effects of weather, the "pull" of centres of population and the position of the major world focal points.

The latter part of the pamphlet is devoted to "Geographical Relationships," which gives the theories and study of geopolitics, and the part played by geography in the causes and course of war throughout the globe.

UNDERSTANDING FLIGHT BY QUESTION AND ANSWER. By R. Hewitt, M.Sc., A.F.R.Ae.S. 112 pp. (Hodder & Stoughton Ltd., for E.U.P. Ltd.; 2s. 6d. net.)

A brief and simple study of elementary aerodynamics and airscrews in question-and-answer form. Suitable for beginners in the subject.



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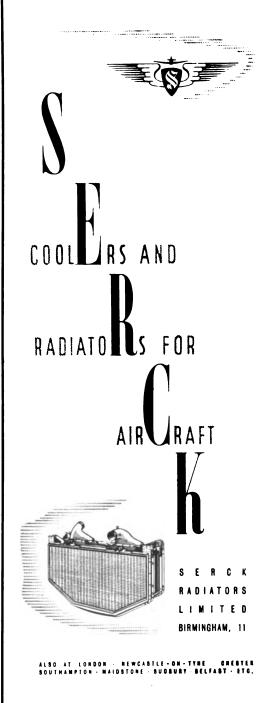
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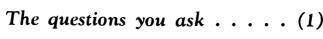
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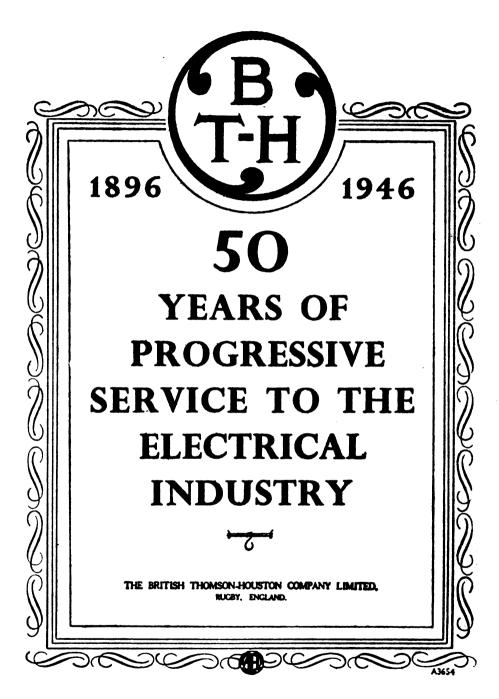
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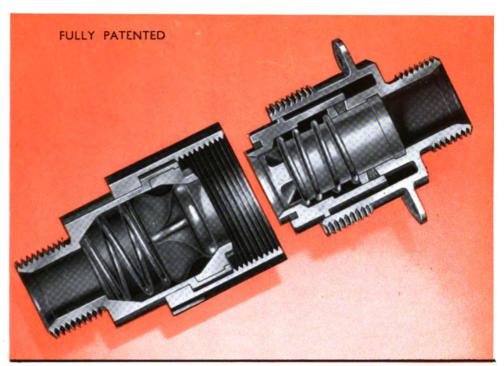
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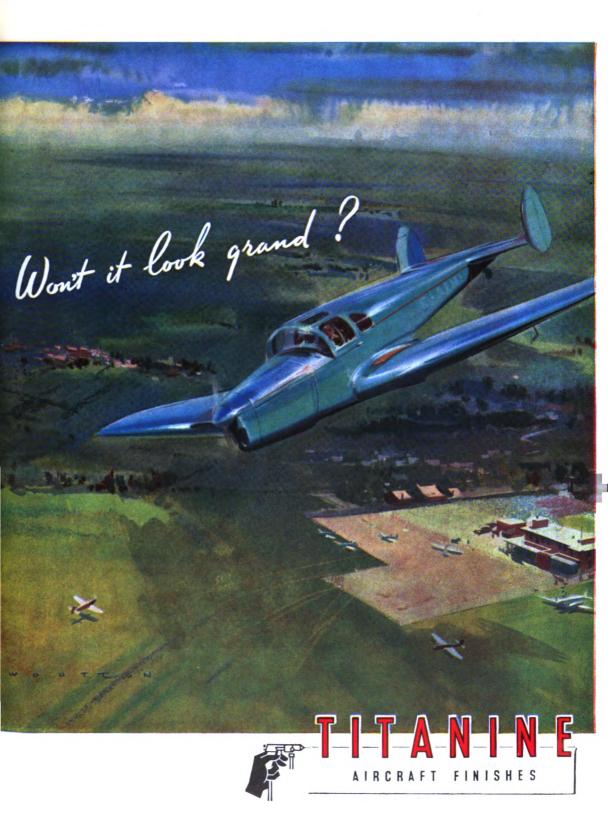
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VOLUME XVII

JUNE, 1946

NUMBER 3

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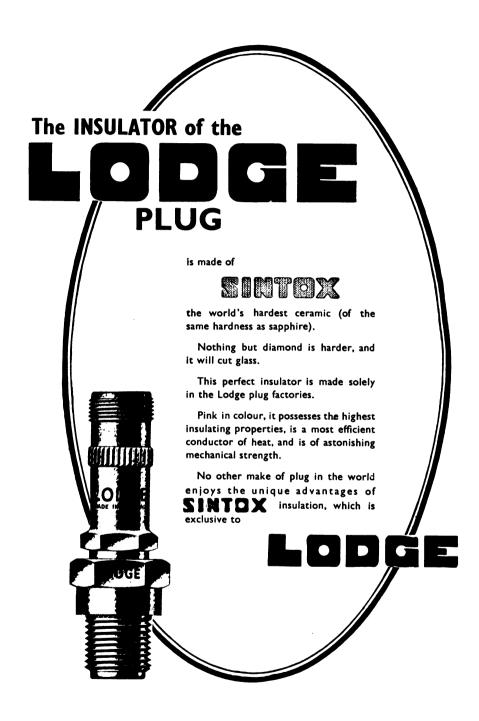
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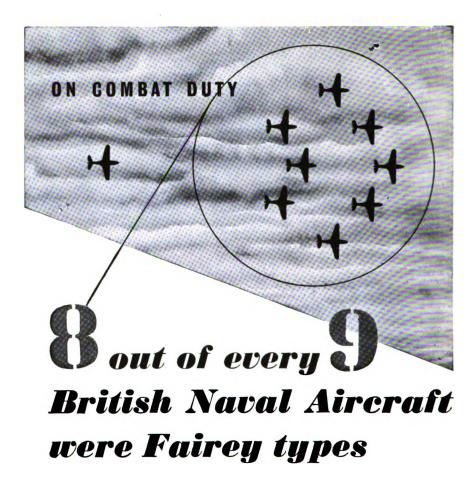
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EDITORIAL

I.—THE DEMISE OF THE LEAGUE

TRONG delegations from all the remaining members of the League of Nations attended the final session of the A the final session of the Assembly at Geneva in April this year for the purpose of bringing the League to an end and of handing over some of its functions and all of its assets to its successor, the United Nations Organization. To those present, the proceedings must have seemed rather like a funeral but with this difference, that, whereas a funeral is conducted "in sure and certain hope of the resurrection," the obsequies of the League of Nations were conducted with the resurrection already an accomplisned fact. The United Nations Organization, which is the reincarnation of the League of Nations, owes, and does not fail to acknowledge, a great debt of gratitude to its predecessor, whose experiences have already proved themselves to be invaluable—its failures no less than its successes. For the Charter of the United Nations shows with unmistakeable clearness how its authors have sought to profit by the mistakes of the past and to bring a more realistic policy to the tasks of the present.

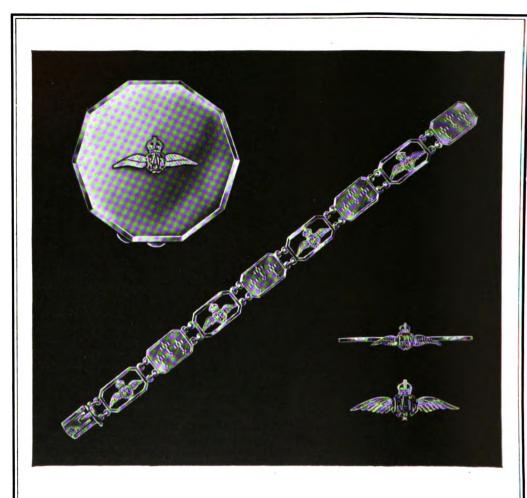
Among the more venerable figures at these final meetings was that of the veteran Lord Cecil of Chelwood, than whom no one has done more to further the objects of the League and to enlist support for it in this country. He said: "The League failed solely because the member States did not accept the obligation to use and support its provisions." Doubtless the absence of the United States was a serious handicap; but even so, had the existing members pinned their faith to it, framed their foreign policy upon it, and been prepared to do their share in upholding it, the history of the world during the past quarter of a century might have been very different. Lord Cecil's words are not only a condemnation of the past but also a warning for the future. The Charter of the United Nations provides for the maintenance of peace by force, or the threat of it; and it is to that extent more practical than the Covenant of the League of Nations, which enunciated principles but omitted to provide sanctions. But let us not be lulled into a false sense of security. The United Nations Organization depends, as the League of Nations depended, upon the moral and material support of its members, and in particular the more powerful ones. If they fail, the United Nations fail, and the world will fall back again into anarchy with the additional horror of rocket-propelled projectiles and atomic bombs.

II.—REGIONAL AGREEMENTS (a) Lord Vansittart's

Regional agreements are a recognized part of the machinery for maintaining peace, and are specifically mentioned as such in the Charter of the United Nations. At this very moment the representatives of Australia and New Zealand, meeting in London, are proposing some form of regional agreement between themselves, the United Kingdom, the United States, France, Holland and Portugal for the security of South-Eastern Asia and the South-West Pacific Area in which they are all much interested. And in January of this year, one of our elder statesmen, Lord Vansittart, made an eloquent and moving appeal in the House of Lords for a regional agreement between the Western European Powers-what he called, in the words of his motion, "a closer integration of Western Europe."

He began by quoting Field-Marshal Smuts, who had pointed out the necessity for regional agreements long before San Francisco and had specially mentioned a Western European Group. And Lord Vansittart also pointed out regional agreements already existed, "good and plenty, ancient and modern, mentioning the Arab League, the Act of Chapultepec (strongly supported by the U.S.A.) and the "train of protectorates that Russia has now formed in Eastern Europe." He said that Western Europe had always paid a hideous price for lack of that very co-ordination, and twice the whole region had been very nearly destroyed. Military co-ordination must be based on political co-ordination, but not necessarily political conformity; and a Western European Group would contain a wide variety of forms of government but would, at the same time, have a common policy as to defence and mutual support against aggression. And to make co-ordination easier and more effective, agreement should extend into the economic sphere, so that, by the removal or reduction of trade barriers, some measure of free or freer trade might be established, to the mutual advantage of all members of the Group.

Lord Vansittart suggested that the Western European Group might include, to begin with, Britain, France, the Netherlands, Belgium, Luxembourg and Scandinavia, with the possible addition later on of Italy, Spain and Portugal. He emphasized that all members must continue to enjoy their freedom as independent sovereign states; but unless they got together and formed a united front against another act





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of aggression, from whatever quarter it might come, Western Europe would soon decline in prestige and in influence. Nor was this merely a matter of pride. For many centuries, Western Europe led the world in culture; and there is a Western heritage, he said, which it is not only our wish but our duty to protect.

Unfortunately any suggestion of, or attempt at forming, a Western European Group for mutual advantage and defence immediately raises a storm of protest in Eastern Europe, where "a powerful combination of Communism and Pan-Slavism" is busy consolidating its position and making itself secure from outside interference. The West has no objection to such justifiable precautionary measures in the East; but surely the West should be allowed to do the same for itself without protest from the East. That is only fair. And it appears that Marshal Stalin made a speech in April, 1945, from which it was clear that he then expected a Western integration as complementary to the Eastern.

What then is preventing the formation of a Western European Group? There are not wanting statesmen of the principal nations concerned, and even of Russia, who have already expressed their hopes for its establishment as a necessary and principal buttress to the United Nations Organization. If the nations of Western Europe are really convinced of its necessity and it is difficult to imagine any reasons for holding the contrary view with the experiences of the past forty years fresh in the mind—then what prevents their proceeding to establish it? Do they suspect some loss of sovereignty in the process? We have already shown that there is no foundation for any such suspicion; and we must add that they will certainly be running a grave risk of losing all their sovereignty if they don't take this precaution. Or are their governments afraid of doing something at which some other power or powers might take quite unjustifiable offence? We cannot believe this, but if it be true, our comment is: then you have already begun to sacrifice your sovereignty, and the decline will soon get swifter unless you check it at once.

(b) Mr. Churchill's

On similar principles, Mr. Churchill, at Fulton, Missouri, on 5th March, urged with all the force of eloquence and sincerity the need for an understanding or agreement—a regional agreement within the meaning of the United Nations Charter—between the British Commonwealth and Empire on the one hand and the

United States of America on the other. Such an idea, though much wider in scope (if distances and areas are to be considered) is really no greater in principle than Lord Vansittart's, which is far more complicated. The formation of a Western European Group will entail overcoming many difficulties from which the other may be free, e.g., differences of language, of cultures, of standards of living, ignorance of one another's outlook, and so on.

But, indeed, Mr. Churchill's proposal for closer co-ordination between all the Englishspeaking peoples of the world—and India too if she will—for the maintenance of peace under the United Nations Organization would go far to make the United Nations a success. It would be a complementary group to that Western European Group proposed by Lord Vansittart. The two groups would be firmly linked by having the United Kingdom as a common member; and each would derive immeasurable strength from the support of the other. If these two groups were formed and co-ordinated, there would be far less danger of war than at any time since the decline and fall of the Roman Empire.

We are not quite sure how His Majesty's Government viewed Mr. Churchill's speech at Fulton. It was presumably "irresponsible" in the sense that Mr. Churchill delivered it at a time when he was not a responsible Minister of the Crown, and therefore did not represent the Government or express their policy. But two important facts must here be taken into account. Mr. Churchill is the Leader of His Majesty's Opposition, which is a recognized appointment in the House of Commons, and as such he speaks for a large section of the House. Secondly, Mr. Churchill is so well known abroad, owing to his leadership of Britain during the war, that very many of the people of other nations must still be in the habit of regarding his voice as the voice of Britain. If so, then the effect of the Fulton speech both in America and elsewhere must have been greater than his constitutional position warrants. He may have caused some little embarrassment to the Government, but it is more probable that they will make use of it as a "ballon d'essai" and note its repercussions for future guidance. Be that as it may, we hold very strongly to the view that a Regional Agreement between the British Commonwealth and Empire and the United States of America and another between the Powers of Western Europe, each to support the other, would give the world greater security than it has known for 1,500 years.

XII EDITORIAL

III.—BEGINNINGS OF THE PEACE TREATIES

On 25th April, "in the pleasant warmth of spring sunshine," as *The Times* Paris Correspondent reported, the Foreign Ministers of France, the Soviet Union, the United States and the United Kingdom met to begin drafting the peace treaties. This was, in effect, a resumption of their meeting in London last autumn and was in accordance with a decision, made at Yalta and confirmed at Potsdam, to entrust the preparatory work to the foreign secretaries of the powers concerned.

Thus the work of treaty writing proceeds in a calmer atmosphere than that which prevailed at Versailles in 1919. If the world has grown sadder, it may also have grown wiser; and there is good reason to expect that the treaties, which these experienced and ably advised men are preparing, will form good foundations upon which the future peaceful development of the defeated countries may be built. For it is generally recognized that reprisals or economic injustice of any kind are almost certain causes of future wars; and while rightly depriving the aggressor of the means of repeating his aggression, it will be the very difficult task of the treaty writers to ensure that he has adequate means for maintaining his economic balance.

Not the least of the difficulties which confront the treaty writers is that of composing their own differences of outlook where defeated enemy nations are concerned. It is not only a question of what to do with the vanquished, but how are the victors to treat one another in matters connected with the conquered state? That, we suspect, may prove the more difficult phase of the problem.

IV.—Defence of the Imperial Commonwealth

It is very gratifying to note that many of the suggestions contained in the essays submitted for the ROYAL AIR FORCE QUARTERLY Essay Competition this year are also appearing at higher levels in speeches by members of the Government and by the representatives of the Dominions now assembled in London to discuss plans for defence.

It is too early yet to consider details, but there is obviously agreement upon certain fundamental principles. The imperative need of a planned defence policy for the whole Empire, as well as our obligations for enforcement action in support of the Security Council under the United Nations Charter, render it essential that the resources of the British Imperial Commonwealth in manpower and material shall be so organized as to ensure that (a) the maximum

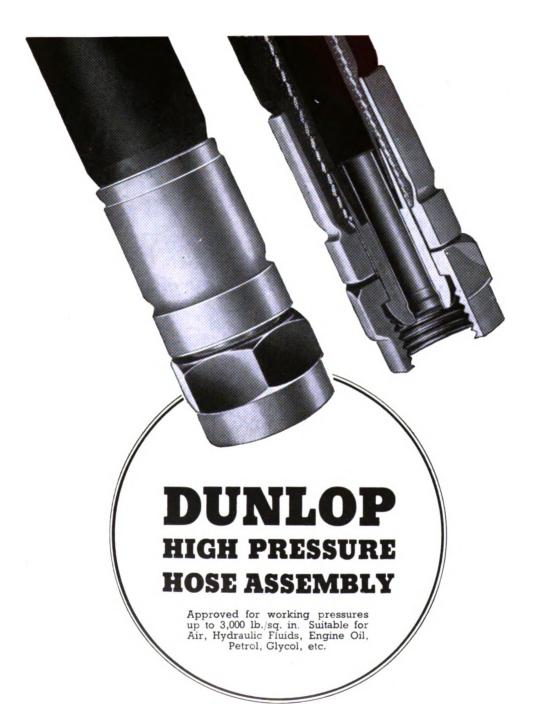
power shall be developed at any desired point in the minimum of time, and (b) the naval, military and air power of the Commonwealth shall be capable of withstanding any initial shock and possess that endurance by which it will outlast and wear down any enemy. And this will apparently involve, in addition to coordination of training and equipment, some redistribution of population and industries, the pooling of results of experience and research, frequent interchange of personnel, the organization of defence on regional bases in which every region would be self-contained and, as far as possible, self-supporting, and an equitable distribution of the financial cost among all members according to their capacity.

Until accurate information is obtained concerning our commitments to the United Nations and until our naval, military and air experts have prepared their appreciations of the world situation as it affects the defence of the Commonwealth, precise figures for navies, armies and air forces cannot be determined. But we may be assured that the Imperial Commonwealth will not again be left in the defenceless condition in which it found itself when the Second World War broke out; and that all its resources will be integrated and co-ordinated in such a manner as to ensure the preservation of its integrity, its adequate contribution to the maintenance of world peace and its proper influence in the councils of the nations.

V.—Officers' Pay

Officers of the Royal Air Force, in company with officers of the other two fighting services, will have welcomed the publication in March of the White Paper (Cmd. 6750, H.M.S.O., 6d.) which sets out the post-war code of pay, allowances, retired pay and service gratuities for commissioned officers of the armed forces. Extracts from the White Paper are reproduced elsewhere in this number of The Royal Air Force Quarterly. (Details of the new rates of pay for warrant officers, non-commissioned officers and airmen were reproduced in our March number—pages 111-116.)

The two most satisfactory features of the new rates of pay for officers, which are to take effect from 1st July, 1946, are these. First they provide a "living wage" from the day of joining for duty (bearing in mind that food and accommodation are both "found" and that the cost of the initial outfit and uniform need not exceed the allowance by any considerable sum); and, secondly, they make it possible for an officer to get married and live on his pay and marriage allowance at the age of 25. These two



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reforms, even if long overdue, will have abolished two Service evils. The former need for an officer to have private means has kept out many men otherwise well fitted for leadership and command in the fighting forces, and the financial difficulties of marriage under thirty years of age, for those with but slender private means, has deprived the nation of thousands of splendid young citizens of that particular kind which not only makes the best officers but fills with undoubted success posts of great responsibility in the Civil Service and in Colonial Administration. Thus by this wise and statesmanlike measure has the Government opened the commissioned ranks of the Royal Air Force to all those most qualified, by their personal qualities, to lead and to command; and also

made it possible for them to marry and begin to have children at the most suitable age.

One criticism, however, we would offer. It is a pity that the marriage allowance is so rigid and does not vary at all with the number of children. If, as we suppose, the Government desire to encourage people to have children, we should have expected this concession. But perhaps the Family Allowances Act, when it comes into force, will remedy this anomaly.

As certain officers at present serving in the Royal Air Force would be worse off under the new code than they were under the old, mainly because allowances now become taxable, a special concession will be made to them. The difference will be paid as a "war excess," which will be gradually eliminated as pay increases with promotion.

R.A.F. QUARTERLY AND EMPIRE AIR FORCES JOURNAL

Essay Competition, 1946-47

The subject and conditions of the next competition will be published in the SEPTEMBER number. The Essay will be on a subject of interest to, and will be open to members of, all three Services.

New Features

When more paper becomes available the extra space provided thereby will be devoted to articles on Service Life and Experiences, and to articles and verse of a humorous character. In the meantime, we shall devote some of the existing space to articles of this nature and we shall be pleased to receive contributions from now on. The fees offered for such contributions will be on the same scale as those dealing with professional subjects.

Photographs, and Pen and Pencil Sketches

Any number of these will be most welcome at

all times; especially those depicting Service life at home and overseas. Humorous and other sketches, either as illustrations to articles and verse or separately, are particularly required. All contributions may be sent direct to the Editor:

> Wing Commander C. G. Burge, c/o Gale & Polden Ltd., Ideal House, Argyll Street, Oxford Circus, London, W.I.

Photographs and sketches should have the name and address of the sender written on the back of each, and should be well packed between stiff paper or cardboard.

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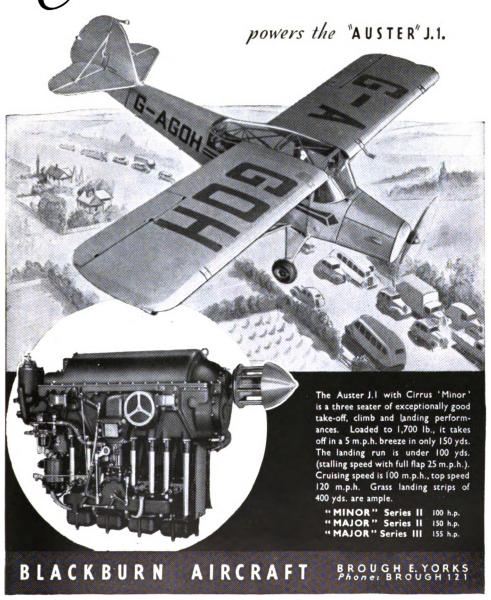
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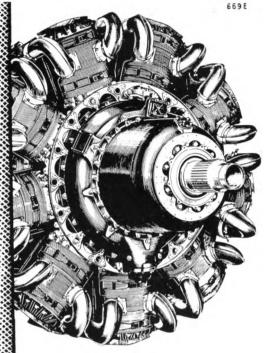
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COMMONWEALTH'S PART IN WORLD SECURITY

"AREA OF STABILITY" SAYS GENERAL SMUTS

ENERAL SMUTS, South African Prime Minister, in a South Africa Day broadcast from London on 31st May, referred to United States and Russian domination in the East and the West. The British group might yet prove the area of stability between the two power poles.

General Smuts was impressed at the Commonwealth Prime Ministers' Conference by the inspiring picture of the Commonwealth as a happy group of communities, working together

harmoniously in peace as in war.

"Our group stands justified before the world. It is sure of itself and confidently facing the

future.

"The United States and Russia have come to dominate the East and West of this globe. Both have a continuous land mass, a concentration of population, of war, man and economic power such as the world has never seen.

"It is a unique, an almost frightening, situation of a world lapsing into dualism. In between them lies scattered, sprawling over the seas, the British group, which may yet prove the saving grace of this vast power constellation, the area of stability between the two power poles.

GREAT RESPONSIBILITY

"As between the two Great Powers on East and West, it is like a governor in the middle which prevents them from disrupting our world. Let neither great Americans nor great Russians look upon it as a danger, as something menacing their greatness.

"Germany may not again become, and probably will not become, a military menace for a long time, if ever. She may easily become a no less dangerous menace of another kind.

"As a vast depressed area—human and economic—she may become a centre of infection which may poison much of the Continent. This is well understood, but seems to be the course marked out for her by present policies which must inevitably entail a terrible responsibility, perhaps heaviest of all on Britain.

"Any human and economic collapse will be most severely felt in the British zone.

"The situation clearly calls for a revision and reversal of policies which will at least minimize the terrible human and social situation which looms in the not distant future.

FEDERAL SYSTEM

"Destroy the Germany of Bismarck and Hitler. By all means do away with the highly centralized Germany whose military might proved a menace to the world. Decentralize it in a federal system which will be rendered incapable of again becoming a menace and which might be safely integrated ultimately into the United Nations.

"But do not attempt to destroy a great, historic people or their homeland, or their means of livelihood. The attempt will not only be a crime, but an error doomed to failure.

"Mere dull, brutalizing punishment does not suit the temper of our world now moving to a new consciousness of the human. The United Nations is the positive constructive answer to Hitler's destructive plan. Only on that road lies the secret of world peace and the attainment of man's vast future.

-The Daily Telegraph.

[We shall report General Smuts's broadcast in full in our next issue.—Editor]

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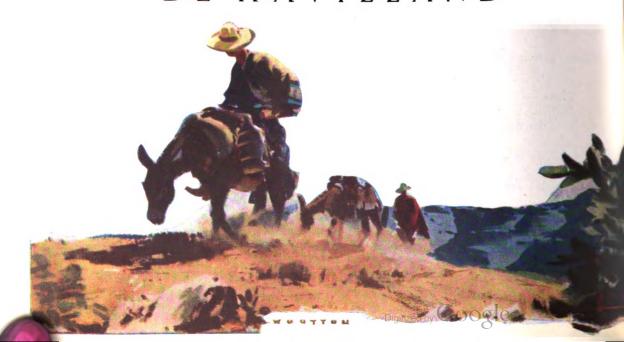


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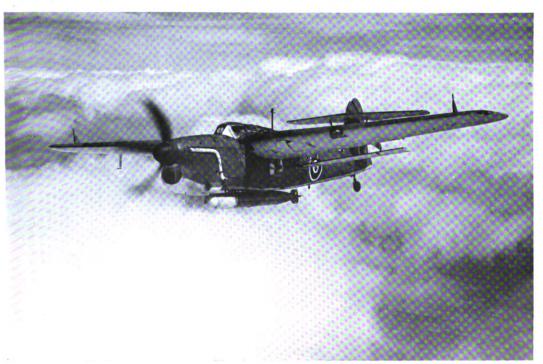
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The Covenant of 1919 and the Charter of 1945

By J. M. SPAIGHT, C.B., C.B.E.

THE TWO INSTRUMENTS

►HE makers of the Charter had one obvious advantage over the makers of the Covenant: they had the accumulated experience of the twenty years of the League's effective life to guide them, and they were thus able to profit by and to avoid their predecessors' mistakes. The first of these was, as is now fairly generally recognized, the too-hasty framing of the Covenant. No similar fault could be found with the way in which the Charter was drawn up. There was prolonged consideration, first at Dumbarton Oaks, later at San Francisco, of the provisions submitted for inclusion. Furthermore, the secondary States had had a very small voice in the making of the Covenant. They had very much more to say in the discussions at San Francisco. How that conference compared in these respects with the discussions at Paris in 1919 was explained in the British official commentary on the Charter. It said:

"It will be seen that the procedure of the San Francisco Conference was one never before adopted by States in the consideration of such vital problems. The Sponsoring Powers1 submitted their proposals to the fullest discussion by forty-six other States. Each of these States had only one vote and everything in the Charter was passed in the Technical Committee by a two-thirds majority before the final text was adopted unanimously at the Plenary Session. At the Conference at Paris in 1919 the Covenant of the League of Nations was drawn up by a Committee in which the Principal Allied and Associated States had a majority of representatives, and even then it was not admitted that disputed questions could be decided by vote. In the two Plenary Sessions in which the Covenant was approved no opportunity was given to those States not represented in the Committee to make alterations in the text. Finally, the Covenant was made part of a general Treaty in which other vital interests of the States concerned were affected."2

LORD CRANBORNE'S COMPARISON

The result was that there emerged from San Francisco a scheme much more carefully screened and weighed than that for the League of Nations had been. It was in all essentials the scheme which had been drawn up at Dumbarton Oaks six months before, and how the latter project compared with the Covenant was briefly explained by Lord Cranborne in the House of Lords on 11th October, 1944. In four respects, he said, the new system represented an advance upon the old as a preventive of war. First, it was "both more flexible and in some respects less legalistic than the League on certain occasions proved to be." Secondly, "it places the responsibility for international security four-square on the shoulders of the nations best able to bear it." Thirdly, "the proposals allow for the supply to the organization of a really serviceable set of teeth—a thing that was not always available to the League as we knew it before the war." Fourthly, the military provisions should ensure that "armed force can, if necessary, be brought to bear swiftly and effective either to maintain or to restore peace." Here, said Lord Cranborne, "the new air arm will be of immense importance."3

Some Other Differences

In the White Paper issued after the conversations at Dumbarton Oaks, a rather more detailed summary of the main differences between the new project and the League of Nations was given. There was a considerable likeness, it stated, between the Covenant and the proposed Charter, but there were important differences between the two plans.

"While the Covenant in certain cases allowed war to be made legally and there was no obligation on its members to intervene with force to repress violence until war had actually broken out, the new organization would not only try to abolish the use of all violence between States but could intervene when violence is merely threatened. Indeed, it would have the duty of investigating disputes before even a threat to the peace had developed, in order to take action if the continuance of the dispute might endanger peace. Under the Covenant, though the Council or Assembly could advise that an occasion for the imposition of sanctions had arisen, each member had to decide whether it would put them into force. In the proposed Charter each member would undertake to put economic sanctions into force at the demand of the Security Council, and to execute the special agreements which had been made as to the quotas of military force which it

¹ United States, United Kingdom, Union of Soviet Socialist Republics, and China.

White Paper Misc. No. 9 (1945), Cmd. 6666, para. 12.

³ House of Lords Debates, Vol. 133, cols. 486-87.

would place at the Security Council's disposal for immediate action."4

Further reference is made later in the present paper to the points of difference summarized above, as well as to some others not mentioned. Another improvement was referred to in the White Paper, as follows:

"In the Covenant there was no provision for the preparation and co-ordination of the military forces to be placed at the Council's disposal except the Advisory Board set up in Article 9, which never functioned for this purpose. Under the Charter it is intended to set up a Military Staff Committee, composed of the Chiefs of Staff of the States with permanent seats, or their representatives. This Military Staff Committee would be responsible under the Security Council for the strategic direction of armed forces placed at the disposal of the Security Council, and for advice to that body on all military matters with which it is concerned."

SPEEDIER HELP IN NEED

From the summary quoted above it will be evident that in the new project an attempt was made to rectify a number of the shortcomings of the earlier scheme. One of these, and the most important, was the failure to ensure that the restraints of aggression for which the plan provided would be forthcoming in time, or indeed forthcoming at all. The framers of the Charter were at pains to see that their project should not be open to a similar criticism.

They did so, as indicated in the summary, first by empowering the Security Council to decide upon the preventive action to be taken, instead of merely making a recommendation; secondly, by abandoning the rule of unanimity which had prevailed in the Council of the League. It is true that under the Charter all the five Great Powers must be unanimous when it is a question of taking enforcement action, but otherwise the rule of the majority vote⁶ prevails, and so far as it does a decision is less likely to be vetoed than was a recommendation of the Council of the League. The Soviet resort to the veto in January-February, 1946, however, was rather disquieting.

THE ORGANIZATION OF FORCE

Next, in the Covenant no attempt had been made to organize beforehand the international force to be used for the purposes of the League. In the Charter there is provision both for the machinery and for the procedure that are necessary. The Security Council is empowered, as the Council of the League never was, to make arrangements with the member States for the furnishing of contingents of all arms when the need for them arises, and is provided with a Military Staff Committee whose duties are much more extensive than those assigned to the Advisory Board under the League. The agreements, it is stated in the Charter, are subject to ratification by the signatory States "in accordance with their respective constitutional processes." When they have been so ratified the Security Council will be in a position to call for them in the foreseen emergencies without waiting for further or ad hoc authority from the States which had undertaken to supply them. There should thus be less danger of a hitch or a delay in the application of military sanctions than there was under the Covenant: not to mention that under the latter system the Governments might not apply them at all.

The Security Council is to have an instrument of enforcement such as the Council of the League never had, despite many attempts by its supporters to equip it with one: an air arm of its own. The air arm is to be composed, it is true, of national squadrons, but it is to be none the less a true international air force, of the contingential type. The units are to be kept in a state of instant readiness at the Security Council's call. They are to have as first priority the duty of carrying out such missions as the Military Staff Committee may assign to them. Behind this earmarked force there is to be the pool of forces of all arms from which the Security Council may call for contingents from the member States to enforce its decisions.

EARLIER INTERVENTION

In general, the Charter contemplates an earlier intervention in a critical situation than did the Covenant. The Covenant was rather obsessed with the overt act, the resort to war, the actual aggression. The Charter looks to the situation preceding that development. It enables, or should enable, a war to be stifled before birth. Because it does so it is able to side-step one of the difficulties which could never be solved in the days of the League. "The old search for a definition of aggression," said The Times on 12th October, 1944, in a special article on the Dumbarton Oaks project, "is made pointless by provision for arresting the potential aggressor when his attitude, in the Security Council's finding, is as yet no more than a 'threat to the peace.'" The function of the Security Council, the article pointed out, was to see that a State neither used force northreatened to use it in a manner inconsistent with the purpose of the new organization. This, it was

White Paper Misc. No. 6 (1944), Cmd. 6571, paras. 5, 6 and 7.

⁵ Cmd. 6571, para. 10.

^{*} That is, seven affirmative votes out of eleven.

added, was an important advance upon the system of security embodied in the Covenant.

Another improvement upon the earlier system is the provision (Article 40) empowering the Security Council, before it has had time to make a recommendation or arrive at a decision, to call upon the parties concerned to comply with such provisional measures as it deems necessary or desirable for the purpose of preventing an aggravation of the situation. This may prove to be one of the most important provisions designed to prevent an actual breach of the peace. It will enable the Security Council to impose a kind of pre-war armistice upon the potential belligerents. It would allow a No Man's Land, for instance, to be established on their frontiers and thus to prevent a collision which might be the spark for a conflagration. It would also enable the aggressor to be determined if that were necessary. "The Security Council," says Article 40, "shall duly take account of failure to comply with such provisional measures."

DIFFERENTIATION OF FUNCTIONS

In the Covenant the functions of the Assembly and of the Council in regard to the maintenance of peace were not very clearly differentiated. The Charter is much more explicit in this respect. "While in the League of Nations the Assembly and the Council could take action with regard to the settlement of disputes and the maintenance of international peace and security, under the Charter such action would rest solely with the Security Council." The Security Council is definitely the war-preventing body. It is assigned for this purpose duties more important and exclusive than those which the Council of the League possessed. It differs, too, in reflecting more faithfully in its composition the de facto distribution of power in the international community. The Great Powers are given a much greater voice in the determination of its course of action than they were under the Covenant. To that extent the Charter is more realistic than the Covenant, though the differentiation in question is open to criticism in some other respects.

No Third-party Guarantee

Perhaps the most important difference between the Covenant and the Charter was the omission from the latter of a particular clause which had gone far to wreck any prospect which the Covenant might otherwise have had of becoming an effective instrument of peace and security. This unfortunate provision, Article 10 of the Covenant, the guarantee clause, did more than anything else to prevent American participation in the League. The framers of the Charter were wiser in their generation. There is no "Article 10" in their project. The Charter does include, in Article 2 (4), an undertaking by the members of the Organization to "refrain in their international relations from the threat or use of force against the territorial integrity or political independence of any State"; but this, while an echo of President Wilson's formula, is very far from having the same effect as Article 10 of the Covenant. It does not constitute an underwriting of frontier lines by third-party States. "It should be noted," says the White Paper on the Charter, "that the United Nations do not guarantee the territorial integrity or political independence of all the members." The framers of the Charter followed, in fact, the advice which Mr. Lansing gave in 1919 and to which President Wilson, to his undoing, turned a deaf ear.

There was thus eliminated a probable obstacle to America's ratification of the Charter. The fact that that country and the Soviet Union are participators in the new scheme of security is of paramount importance. "I think it will be agreed by all," said Mr. Attlee (then Lord President of the Council) in the House of Commons on 17th April, 1945, "that one of the great weaknesses of the League of Nations was the absence from its councils of the United States of America. There was, too, the absence during its formative years of the Union of Soviet Socialist Republics. The outstanding fact of the position to-day is that these two great continental States, together with Great Britain and China, are responsible for the present proposals."9

No Pledge to Disarm

The Covenant had a good deal to say (in Article 8) about reduction of armaments, and the contemporaneous discussions in 1919 were more expansive still upon the subject. The Germans frequently asserted that they were given reason to suppose that the (incomplete) measure of disarmament imposed on them was only the first instalment of a general process of the same kind. "There is good evidence for believing that in 1919 disarmament [of Germany and her allies] was welcomed by a great majority, at least, of the four peoples on whom it was imposed, because they believed it to be the first step to general disarmament."10 No such belief could be based on anything done or said in 1945. The Charter enumerates among the functions of the Security Council "the regulation of armaments and possible disarmament." There is no implication whatever that the United Nations have it in mind them-

^{&#}x27;Cmd. 6571, para. 8.

¹ Cmd. 6666, para. 19.

House of Commons Debates, Vol. 410, col. 82.

selves to submit to the drastic process of disarmament which they always intended to impose, and have imposed, on Germany and Japan. On the contrary, the inference from the statements made, in the Atlantic Charter and on other occasions, by leading statesmen is that they intend to remain fairly powerfully armed. It would be to repeat one of the worst blunders of the inter-war period to do anything else.

REGIONAL AGREEMENTS

The Covenant, in Article 21, made a brief and almost perfunctory reference to "regional understandings like the Monroe Doctrine for securing the maintenance of peace." The Charter devotes much more space to "regional arrangements or agencies" for the maintenance of international peace and security. They are definitely a part of the scheme for the new organization, and they will probably have an important contribution to make to the successful working of it. The question of a global versus a regional system is a debatable one, and here it is only necessary to draw attention to the more prominent role assigned to regional agreements in the Charter than in the Covenant. Whether even then their place in the new system has been recognized as fully as it might be is, it will be seen, a debatable question.

SELF-DEFENCE

Closely connected with the enlarged provision for regional agreements is the specific recognition in the Charter (Article 51) of "the inherent right of individual or collective self-defence." The White Paper on the Charter explains why this "most important addition" was made at San Francisco to the project drawn up at Dumbarton Oaks:

"It was considered at the Dumbarton Oaks Conference that the right of self-defence was inherent in the proposals and did not need explicit mention in the Charter. But self-defence may be undertaken by more than one State at a time, and the existence of regional agreements made this right of special importance to some States, while special treaties of defence made its explicit recognition important to others. Accordingly the right is given to individual States or to combinations of States to act until the Security Council has taken the necessary measures. . . . In the event of the Security Council failing to take any action, or if such action as it does take is clearly inadequate, the right of self-defence could be invoked by any member or group of members as justifying any action they thought fit to take."11

The final sentence quoted above does not mean, it is to be presumed, precisely what it says. "Any action they thought fit to take " is rather sweeping. Clearly only such action as is necessary for the defence of the State or States threatened or actually attacked could be justified.

By giving a definite place in the scheme of security to regional organizations and by recognizing the right of collective self-defence, the Charter goes far to remedy one of the failings of the earlier system. It should help to allay the apprehension always felt by the members of the League that the aid promised might come too late or not at all. That fear should be lessened in any case as a result of the speeding up of action by the central organization, but if for some reason such aid was belated or failed to arrive. the additional assurance should ensure that a victim was not left to meet a sudden attack with no assistance from outside.

THE SECRETARY-GENERAL'S INITIATIVE

One unobtrusive provision of the Charter to which there is none corresponding in the Covenant, may have a good deal of practical importance. It is contained in Article 99, which states:

"The Secretary-General may bring to the attention of the Security Council any matter which in his opinion may threaten the maintenance of international peace and security."

The effect is to make the Secretary-General of the United Nations Organization a kind of watchdog of peace. He will be able, as a result of this provision, to originate action for settlement of an international crisis in which, for some reason, no Government is inclined to make the first move. "This," as the official commentary on Dumbarton Oaks stated, "may be a very useful procedure when no member of the Organization wishes to take the initiative."12

There are circumstances in which it may be better that the ball should be set rolling by an authority who is independent and disinterested.

THE EXECUTION OF JUDICIAL DECISIONS

Yet another improvement upon the Covenant is the provision in Article 94 of the Charter relating to the execution of decisions of the International Court of Justice. "The Security Council has been given more power to take action, in case such an undertaking [i.e., to comply with decisions of the Court] were not carried out, than was given to the Council of the League of Nations in a corresponding situation." 18

¹³ Cmd. 6666, para. 63.



¹⁰ P. J. Noel-Baker, "Disarmament," 2nd Edition, 1927, page 24.
11 Cmd. 6666, para. 38.

¹² Cmd. 6571, para. 54.

DENUNCIATION

One final difference between the Covenant and the Charter calls for brief reference. The former provided, in Article 1, for denunciation by a member State; the latter does not. "The question of withdrawal is not mentioned in the Charter, but there was recorded in the minutes of the Technical Committee the opinion that this right remained to each member if exceptional circumstances compelled it to withdraw or if the Organization should have clearly failed to accomplish its purposes." 14

The Executive Officer, Mr. M. W. Davis, of the First Commission of the San Francisco Conference, has added the following particulars; his reference to the Russian declaration may be significant:

"After complicated debate, no provision for or against withdrawal was included in the Charter. In regard to this, an explanatory statement was adopted by the Committee and approved with amendment by the Commission, emphasizing the intention to preserve unity but making explicit the right of States to withdraw because of failure by the Organization to realize its responsibilities or because of inability either to accept amendments that might be made or alternatively to acquiesce in the continuation of the system without amendments that might be proposed by a conference at a subsequent time. In this connection, the Soviet delegate declared in the full Commission meeting on behalf of his Government that no blame should attach to exercise of the right to withdraw for due cause." 16

COVENANT AND CHARTER

There is no doubt that, on the whole, the system of the Charter is a more workmanlike, more practical and more promising system for the prevention of the great majority of wars than

was the system of the Covenant. Its weakness is. first, that it is too centralized a system; secondly, that it shrinks from grappling with the worst wars of all, those in which Great Powers are engaged or are backing bellicose secondary Powers. Because of the voting provisions, it leaves such wars to all intents and purposes outside the scheme. The Charter is, therefore, incomplete as a preventive of war. It does not follow, however, that even then the Covenant has an advantage over it; for the Covenant was not really calculated to prevent any wars, great or small. If under the new international regime 80 per cent. of all conflicts can be averted, that will be something accomplished. The uncovered residue may be brought in in time; and meanwhile by means of regional agreements it should be possible to circumvent this particular weakness in the scheme and at the same time to alleviate its other defect of over-centralization.

The Charter starts its life with one great advantage over the Covenant. The world has just had an unforgettable demonstration of the truth that aggression does not pay. The lesson has been written in letters of smoke and flame across the sky of the planet: a warning to the planners of war, a rainbow of hope to the peoples who want peace, a fiery cross to summon them to defend peace. The retribution which overtook Germany in 1918 was but a pale forecast of that which overwhelmed her in 1945; and Japan, of course, had her withers unwrung until now. The attempt to acquire a Lebensraum or a co-prosperity sphere by force of arms has been proved to be not only a crime but a disastrous folly.

Two other lessons have been learnt also, this time by the victors. One is that half-measures of disarmament of vanquished aggressors are worse than useless. The other is that it is to invite renewed aggression for the peace-loving nations to discard their own panoply. These lessons, too, will be remembered. The two notorious war addicts among the nations will march no more. The rest can advance all the more hopefully along the road of peace if they march in step and bearing arms.

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¹⁴ Ibid., para. 21.

¹⁸ Carnegie Endowment publication "International Conciliation," No. 413, September, 1945, page 447.

The Winged and the Wingless

By "Hybrid"

FOREWORD

HANSARD of 12th March, 1946, in recording the debate on the Air Estimates introduced by Mr. Strachey, Parliamentary Under-Secretary of State for Air, reports one Member as follows:

"... I therefore implore the Government, in settling the structure for the peace-time Air Force, to do all they possibly can to close the gulf which yawns between the

winged and the wingless . . ."

The gulf, it was alleged, had appeared partly through the adoption of centralized maintenance. With that view few will disagree, and Mr. Strachey's announcement, in winding up the debate, that "... we are gradually reverting to the system whereby we have squadron maintenance" will be universally welcomed.

There is, however, another factor which would help to restore unity within the post-war Before the war the technical Air Force. and operational aspects of the Service were kept in harmony by a policy which encouraged General Duties officers to specialize as engineers and to serve alternately in engineering and G.D. posts. In 1940 the growing complexity and rapid rate of development of equipment, and the increasing operational intensity necessitated the formation of a separate Technical Branch. To this G.D. specialists were transferred and thereafter employed on fulltime technical duties. In addition, officers for the new Branch were commissioned both from the ranks and directly in the R.A.F.V.R. In the stress of war it was not practicable to give these newly recruited officers flying training and there arose, therefore, the danger of a cleavage between the ground and air efforts of the R.A.F. If. however, in the Post-War Air Force, there were to be a reversion to the former policy, and technical officers were again trained to fly, this would be a potent factor in restoring the unity of the air and ground functions.

There are two reasons which prompt the suggestion to reintroduce flying training as part of the post-war technical policy. Firstly, there is the prime requirement for unity within the Service. Secondly, there is the fact that the proper treatment of the engineering problems, both technical and organizational, which arise in a flying service, requires the application of up-to-date air experience.

In considering the foregoing suggestion, it

may be of value to review the air effort already made by the Technical Branch (E) since its formation. Dependent upon those ex-sergeantpilots who had reverted to their basic trade and later been commissioned, and upon those ex-G.D. engineer specialists who had been transferred to the new Branch, the effort has been perforce limited and spasmodic. Moreover, being a wholly war-time effort it has tended to dwindle, as rapid expansion brought quick promotion and the early posting of many Technical Officer pilots to jobs in which the chances of remaining in active flying practice on operational types became increasingly remote. Technical officers were debarred from an operational tour so that the new Branch's air effort was restricted to test flying and communication work. Despite all the adverse factors, however, a sizeable air effort was made. Of 112 Technical (E) Officers who were qualified pilots, 98 remained in flying practice and flew some 24,000 first pilot hours between May, 1940, and May, 1945.

The nature of this "technical air effort" can perhaps best be described by a personal account and the following narrative, which is but one of many that could be written, may therefore be of interest. It may also serve to point to possible future applications of a Technical Officer's flying ability, and as confirmation, if any be needed, of the extent to which the Service as a whole would benefit by the decision to train Technical Officers of the future to fly.

"UNDERCARRIAGE UP"

It was a two-year course which I joined at Henlow in 1937, after three years in an Army Co-operation Squadron, for conversion, as I hoped, from a short-service G.D. officer to an Engineer Specialist. Lectures alternated with practical work in workshops, and we flew once a month in somewhat antiquated D.H. Moths and Avro Tutors. Later these types were recognized to be "clapped out" and were replaced by Magisters. The provision at this juncture of a monoplane, with flaps, turned out later to have been a most fortunate event, as it proved to be the vital connecting link between the Audax, on which I had done most of my flying before 1937, and the war-time operational types. Events have since proved that though for two years my flying was restricted to one Saturday morning per month in Moths and "Maggies," it was, if not the best, at least an adequate way



of keeping in flying practice, for I found that I had retained the necessary interest and ability to enable me quickly to get back into full practice on Service types when the opportunity occurred, as it did soon after completing the engineering course. From this I have learnt that it is always worth while, when employed on duties far removed from flying, and perhaps from an airfield, to make the effort necessary to put in, say, two hours, or at worst one per month on even the lightest of aircraft types—indeed on anything that will fly.

My first engineering job was C.O. of a "Queen Bee" Flight. This turned out to be a good thing because not only was I Station Commander, Accountant Officer, Equipment Officer and general "Dogsbody," but also what would later have been termed "Base Commander," as I had a "sort of" supervisory responsibility for the goings on at a neighbouring airfield where Henleys were used for towed-target work. At Henlow we had been shown how to bleed the hydraulic system (of a Wellesley), and knowing from the Maggie what flaps were for, there only remained the controllable pitch propeller as a novelty on the Henley. There were no duals, so after being shown the "taps" there was nothing for it but to ease myself gently off the ground, solo, and to hope to ease myself back again later. This went according to plan and was an important milestone passed. After a little more practice, mainly towing for Blenheims on "air to air" rear gun practice over the Bristol Channel, I felt I had, despite the two years "lost" on light aircraft at Henlow, made the change from pre-war biplane to monoplanes with adjustable flaps, wheels and prop. My undercarriage was "up" and was to remain so for the rest of the war.

TRIAL AND ERROR

I was soon able to broaden my knowledge of "modern" types by borrowing a Fairey Battle. In doing so, I taught myself not to attempt any applied engineering in the air. With the undercarriage up the Henley showed no indicator lights: the Battle showed red. Not having read the Pilot's Notes—these and cockpit drills evolved later—this did not seem right, so I put the undercarriage indicator light switch to "off." I found out later, luckily while still airborne, that the ignition and the undercarriage lights were interconnected. This was a salutary lesson in the technique of flying new types, and of value later.

THE TYPE BUG

In 1941 the woods on the edge of our small grass airfield were taken over by a neighbour-

ing A.S.U. for dispersing aircraft. Single engine types dispersed included the Hurricane, Lysander and Swordfish, and it was a simple exercise in economy of man-power for me, as Station Commander and Station Engineer Officer, to be remustered locally as resident test pilot, for these dispersed aircraft required periodical airings to prevent deterioration. The "type bug" had now bitten hard and opportunities occurred of borrowing other types, either visiting my own or in use at a nearby station.

"UBENDEM. WEMENDEM"

What must have been one of the earliest centralized maintenance flights was also located at my Station. To this Henleys were flown in for major inspections from many towed-target flights in the West Country, Wales and Scotland. The Engineer Officer commanding this Maintenance Flight had been a sergeant-pilot and regularly tested his own products. His Flight's motto was displayed in large letters on the hangar wall: "Ubendem, Wemendem." Unfortunately, one day, owing to incorrect setting of the undercarriage up-lock during a major inspection, the Engineer Officer Flight Commander had to belly-land a Henley on air test. Very little damage was done, but sufficient to provoke the suggestion that the motto be changed to "Webendem and Mendem."

PILOTLESS FLIGHT

Time was when we catapulted the Queen Bees and let them alight on the sea. But we had now begun to fly them off the airfield and to land them back. This land-operating technique saved considerable time, as it eliminated salvage at sea; but it was a delicate business. Pilotless take-offs were quite straightforward (so long as the aircraft was released dead into the eye of the wind); but landings were different. First of all the glide-speed had to be set up correct to within 1 m.p.h., otherwise, when the trailing aerial hit the ground, simultaneously cutting the engine and putting on up-elevator, the Bee would either zoom to 20 ft. and follow this with a spectacular stall, or fly straight into the "deck." Another hazard in bringing the Bee into land was the uncertainty of the extent of damage she had suffered while in front of the guns. Would she "turn left" or "glide down" when ordered? Or would she, while over Station H.Q. or the N.A.A.F.I. go into a spin? Finally, there was the human element. The Controlling Officer stood in the middle of the airfield with a theodolite-like device which acted as a glide path approach aid. Over-confidence was as bad as the lack of it. However,

after a shaky start (was it five or seven successive prangs on landing?) we got pretty good, and used to launch the Bees on pilotless circuits for "fun"—that is, when not required for shoots. This we thought good for flight morale, and necessary because the Gunners were sometimes inactive for relatively long periods. We also had them floodlit for night shoots; a night take-off, but dawn landing, was the drill in these cases. From the flying point of view, these aircraft provided good practice in the accurate adjustment, in the air, of automatic controls.

There were other hazards in this pilotless business. The gunners at the time (1941) were getting keen about their radar and particularly valued the Bee as a target which could be fired at blind, i.e., above cloud. Accordingly we had to fly the Queen Bee blind. This was all right until the Gunners' radar, on which we depended for plotting the Bee, failed. On such occasions, when both visual and radar contact was lost, the drill was to have a Henley standing by to take off and search; had we found the lost sheep (which, let it be said, we never did) we would have shepherded it back by R/T to the ground control. Thunderstorms and the activities of a neighbouring pilotless aircraft flight also tended to interrupt the signals and make our Queen Bees get out of wireless control. But all this helped to maintain the necessary "air" angle on the engineering job.

TWINS

The local detachment of the A.S.U. having started to feed in Wellingtons and Bothas, a short conversion course on Oxfords at the C.F.S. was necessary to enable me to continue to discharge my local test pilot function. This went with a swing, or rather without one, and I soon began to feel at home on any two-engined aircraft. By now I had evolved a mnemonic for a universal "vital actions" cockpit check, before take-off and landing. Provided one knew the taps, it worked for any type of single- or twin-engined aircraft. Famous last words, perhaps, but, anyway, it worked.

O.T.U's.

A transfer to Fighter Command early in 1942 was followed by a supernumerary spell before posting as C.T.O. to a Night Fighter O.T.U. During this period I soon found a useful application for my earlier twin experience by test flying the Blenheims after inspection in the Maintenance Wing, to which I was attached as a "makee-learn." I also had a few days at Tangmere where, by flying as passenger in a Beaufighter Squadron, I got a valuable in-

sight into the operational squadron's way of life. It was not until later that I learned how important it was, as a passenger in a Beaufighter, to make sure that the trap-door on which one stood was securely fastened.

Another valuable visit paid during this supernumerary spell was to Wyton, where some of the earliest Stirlings were standing by to make a final attempt at stopping the Scharnhorst and Gneisenau in their dash through the Straits of Dover. I got a bit more passenger flying here, and some dual; but despite this I still found it incredible that such a vast contraption could get into the air and be controlled by a normal human being. Two years later, however, as a Bomber Command Base Engineer, I was flying them solo, and enjoying it.

THE FROZEN NORTH

I arrived when the Unit was in the throes of converting from Masters and Defiants to Blenheims. Everyone worked day and night and the Servicing Wing, in particular, looked like troglodytes as they worked wrapped up in every conceivable form of woollen clothing, on the night shift in a "Bellman" during a Scottish February. Routine flight-testing of Blenheims and later Beaufighters, notched up the hours, together with delivery flights to contractors or M.Us. for installation of A.I., or occasionally for major inspections. There were three airborne jobs which have remained clear memories: the first air test of the V.H.F. we had fitted, the first Bisley received by the Unit, and my first solo in a Beaufighter Mark II. The V.H.F. worked perfectly, to the delight—and probably surprise—of my Electrical Officer, who had come along with me. The Bisley filled with smoke through a Shadow factory's faulty fitting of the cockpit heating system. The Beaufighter became airborne much too early—this was a type on which one could not have dual -and further alarmed me, still a comparative novice—by developing an odd smell. Had I been a better engineer, I would have recognized it as that of hydraulic fluid. I remembered the saying that one seldom goes into the air without learning something, but thought it a pity that the lesson on this detail of my trade should have been emphasized in that particular way.

TRAVEL BY AIR

Removal to an office desk at Group Headquarters proved no disadvantage so far as retaining an airborne outlook was concerned. The Group was spread from Gloucester to Dundee, and a Spitfire was the best method of travel. There were now in the Group two types of which I had no air experience, the Havoc and the Mosquito. Both taught me more than I expected. The Havocs were "pending disposal" and it was easy to get one for a trip to the North. So delightfully stable was this aircraft that I was able to read the Pilot's Notes (not for the first time be it understood!) on the way North. For the return journey, after being weatherbound in Northumberland for several days, during which the aircraft had been flown by the local C.I. (we had swapped a Typhoon for a Havoc) all the fuel and other gauges which were electric, went "u/s." Having noted that I had had full tanks on starting, I reckoned that I would easily make base on my fuel. So I would have done had the tanks been filled up after the C.I.'s local flying—but they hadn't much! I did in fact make base, but not so easily, as both engines coughed on the circuit. failed in the funnels over the hedge, and both stopped dead on the runway. I was not the only one to profit by this lesson. The C.T.O. at my Station of departure had a few words to say to the Servicing Wing on refuelling procedure.

MOSQUITOES AND OTHER BUGS

My first acquaintance with a Mosquito also laid bare some faulty servicing. The Unit was a new Night Fighter O.T.U. and the troops were still getting the bugs out of the aircraft. Actually, they could not have got around to the one I flew because the A.S.I. went "haywire" shortly after take-off. This, regrettably, perhaps, or possibly fortunately, went unnoticed until wheels were lowered on the approach circuit, when despite a stilly quiet the A.S.I. still read "230." Presumably, none too soon the penny dropped, and I realized it was a matter of motoring in "on the seat of my pants." The pitot head was found to be obstructed by a nest of bugs. Oddly enough, when I next flew a Mosquito two years later, at a different Unit, I experienced exactly the same trouble; on this occasion I was able to tell the ground crew exactly what to do with their pitot head!

COMMAND H.Q. AND THE STAFF COLLEGE

The Command Engineer Officer gave me the cue I wanted. Based on his own habit, for he made a practice of flying everything he was responsible for servicing, his advice was: "If you visit the Station in a car, the types say, 'Who's this old Buffer?' Visit in a Proctor, and they say, 'Good morning.' Visit in a Spit (or whatever they fly themselves) and their greeting is, 'Have a drink.'" There was no difficulty in keeping airborne from the Command H.Q.

HEAVIES

Again a supernumerary spell, this time at Bomber Command H.Q., proved a first-rate investment. The servicing of heavy bomber aircraft held problems not met with in Fighters; so did the flying, as I was to find out. Destined for a job as Base Engineer at a Heavy Conversion Unit, I toured the Halifax, Lancaster and Stirling H.C.Us. and collected a considerable number of clues on the ground and in the air. The chief difficulty in the airborne side of this acclimatization tour was to overcome the doubts which I think probably arise in every fighter pilot's mind on converting to Heavies. "Was it quite safe to take so many people into the air at one time? " "Crew" they were called. Then there was the question "How much could they be trusted?" "Dammit" in a Spit, or solo in a Beau, one had become accustomed to finding one's own way about (with the aid of V.H.F.)—"These navigators, wireless operators and bomb aimers may not be right." But they always were. Then again, the aircraft themselves; surely, they suffered from excessive friction or something in the controls. But no! It was all meant to be like that, and it all came right in the end.

I was first sent solo on "four" in a Halifax. From that to a Lancaster was a "piece of cake." It then became clear, however, that I was to go to a Stirling Base, and there was, therefore, nothing for it; that "ingenious device for getting an undercarriage into the air" would have to be mastered. It was; with the help of a gallant (I thought) Flight Engineer. Together we learnt that the Stirling would bounce, well—provided it was bounced straight and not sideways. To improve my knowledge of the Stirling, I did a little night "passenger." To sit with a sprog crew in the rest (or is it crash?) position, while their equally sprog skipper is being put through his night circuit and landing paces gives food for thought.

As time passed and with the help of my New Zealand test crew, I came to like the Stirling, despite minor incidents normal to a Heavy Conversion Unit, such as tyre bursts and engine cutting on take-off. Together we went searching for ice in clouds as part of a series of attempts to fathom the oil cooler "coring" trouble; we tried take-offs at the maximum all-up weight but with reduced power, in an effort to obtain better engine reliability; and finally we went with the last of them to a delightful spot in Bedfordshire, where, among the green trees and deer, they were to be broken up, after a long and honourable life.

The Heavies must not be left without men-

tion of an operational trip in a Lancaster. This had to be authorized by Headquarters, and I was hesitant to ask my Command Engineer Officer in the stress of war to arrange it. No one was more surprised than myself when permission came through the same day to go that night. Afterwards I realized that I should neither have been hesitant nor surprised since the value to be derived by an engineer from an operational sortie was well understood by both Technical and Air Staffs. The experience, let it be said, revolutionized my ideas about servicing. Thenceforth, more than ever before, it was clear to me that we on the ground must give all we have got to satisfy the Air Staff and to ensure the aircrews' safe return. "If only," I thought, "all Engineer Officers could be given this experience—just once."

A MIXED BAG

During the last three months of the war I was able, in a composite Group operating Mosquitoes, Halifaxes and Stirlings, to put to good use my earlier experience on fighters and bombers. Four jobs were of particular interest. A certain crew had, with a Stirling, removed part of the roof of a house; they complained that a trimming tab cable which had broken in the air had been the cause of this unfortunate incident. Having read the "proceedings" as Group Engineer, I visited the Station, and with the help of a crew from the squadron and of a carefully briefed technical N.C.O., arranged to undo the allegedly offending cable while airborne. We did not hit a house, and disposed of the case to the satisfaction of all—except that of the low-flying crew.

On another occasion two stations were wrangling as to the merits of a Halifax which had been transferred from one to the other. It was useful to be able to make an inspection of the aircraft on the ground, personally air test it, and deliver Solomon's judgment, which, if not acceptable to all, could hardly be gainsaid.

The third job one remembers as a productive one, having a combined engineering and flying interest, was taking an R.A.E., Farnborough, observer to 30,000 ft. in a Mosquito XXX, as part of a series of trials on supercharger intercooler temperatures. I have always wondered whether he knew it was the first time I had been to what was to me a somewhat dizzy height. Somehow I think he did.

A trip shortly after the end of the war served at a fitting wind-up to the six years' air effort. On this occasion the crew of the Mosquito was 100 per cent. Tech. (E)—the navigator being a squadron leader ex-sergeant pilot whose last trip over France had been on operations with a Battle Squadron in 1940. The fact that we chose a somewhat coastwise trip to "Mulberry" was not because we did not know how to work the Gee—although we did not!

CONCLUSION

The nature of the war-time air effort of the Technical Branch is covered fairly accurately in the foregoing paragraphs, for although the personal effort was small, involving only some 600 first pilot flying hours, it embraced most of the roles normal to a flying technician. It was one of many which, in sum, serve to show that the Technical Branch strove to the best of its ability during the war years to maintain a real appreciation of Air Staff requirements and technique. The Branch's air effort was, it is also interesting to note, a spontaneous one. It was an "extra" done by officers filling nonflying appointments, but inspired by the conviction that it was essential to preserve intact the air-link between the winged and the wingless. The Branch's effort had, too, a direct and practical value, in that by bringing flying as a personal reality into the servicing field it helped to preserve high standards of work and of morale amongst servicing personnel.

So much for the past. The narrative will also have served to show the nature of the broad field of practical air activity which exists for the Technical Officer who is also a qualified pilot. Routine flight testing of the products of that part of the repair organization for which he is responsible, participation in service trials of new equipment, defect and accident investigation, and experimental test flying; all these tasks are the better performed when a combined technical and flying knowledge can be applied. It would also be a step towards air mobility if a Technical Officer could fly himself, his men, and their tools to an advanced airfield, or to a salvage job.

Such would be the tangible results of the decision to give flying training to Technical Officers in the Post-War Air Force. The less tangible, but equally important benefit, which the Service would reap, to wit, the closing of the gulf, which during the war years inevitably yawned ever wider between the winged and the wingless, has already been mentioned. Experience has shown, however, that the gulf would not be properly closed if Technical Officers merely flew light aircraft; they must be trained to handle operational types, particularly in test flying, and be kept in close touch throughout their

careers with the work of front-line units. Indeed it is held that it would be no waste of effort if Technical Officers were, early in their careers, perhaps immediately after completing their flying training, to serve for six months or a year on full flying duties with a squadron. Thereafter, some could be seconded back if necessary after refresher training, for further similarly brief tours. In this way, there would be developed a highly efficient Technical Service closely knit with the Air Staff, and one capable of expansion should the need ever again arise.

The Use of Allied Air Power in the War Against Japan

By Wing Commander R. J. Harden

THE higher aim of the Allied air strategy against Japan was to weaken resistance to the final assault by the Allied land and sea forces on Japan itself to such an extent that landings could be undertaken with the maximum chance of success. Though this definition seems rather obvious, it is significant because it implied that Japan could not be beaten by air power alone. Her defeat could be consummated only by the occupation of her homeland by the Allied armies, though this would be possible only when we had obtained complete air superiority over the assault areas and, of course, when we had secured our communications to the assault bases.

In the adoption and application of their air strategy the Allies profited by the lessons learnt in the use of air power against Germany. When the strategic bombing of Germany started, many people believed that she could be bombed into submission. But we know now that a determined, courageous and resourceful enemy in a country as large as Germany or Japan can adapt himself and even become accustomed to heavy bombing, provided that it is non-atomic; and it is quite evident that the Combined Chiefs of Staff were very soon convinced, if indeed they were ever in doubt, that the invasion of the Continent was essential for the final defeat of Germany. At this time the atomic bomb was at the experimental stage and therefore did not affect air strategy as it is likely to do in the future.

The strategic bombers attacked the German industrial and economic machine with the object of reducing output and lowering civilian morale. The targets had to be selected by experts in accordance with the conduct of the war and its probable course, always bearing in mind the aim. For example, priority targets were, at different stages, ball-bearing factories, aircraft factories, synthetic-oil plants, rail communications, the docks at Hamburg and Emden, inland waterways, U-boat factories and the flying-bomb experimental establishment at Peenemunde, to mention a few. But all this tremendous air effort

could not, by itself, force a decision. It was not intended to do so. It was directed primarily at reducing the resistance of the Wehrmacht to the invasion, and, let it be said, succeeded beyond all expectations, as was evident by the relatively few casualties we suffered on the Normandy beaches.

Japan was subjected to the same treatment by the strategic bombers, and as the strategic offensive changed into high gear the tactical air forces started to deploy to seal off the areas for assault by interdiction. But to reach this stage a long and bitter struggle had been fought, with the air power of both sides playing a major and spectacular part.

Japan is an island power and free external communications are as vital to her as they are to Great Britain. Because Japan had become industrialized she had to import a large proportion of her food, principally from the Yangtze Valley. She was self-supporting in copper and coal, but had to import most of her iron, and all her cotton, oil and rubber, and other important raw materials. Without a constant flow of raw materials from her newly won empire, Japan could not sustain a major war for long, and the severance of her Pacific communications was a direct and major contribution to the essential weakening of her war potential. Moreover, Japan had large forces deployed throughout her conquests dependent to a large extent on supplies from the homeland. Without supplies they could not survive for any long period and could be destroyed at the convenience of the Allies. Another important factor was that they could not reinforce the defence of the homeland against the Allies' final assault once their communications were cut. For the maintenance of her communications Japan relied primarily on her air power, most of which was land-based.

The higher aim of the Allied air strategy resolved itself, at a lower level, into two parallel aims, which were to cut the Japanese main supply lines and to establish bases from which to start

the strategic bombing of Japan herself. This in turn resolved itself into a struggle for air bases throughout the Pacific. Air bases primarily, because, first, the enemy air power had to be destroyed, and this could be done only by air power. Because our air power in the initial stages was carrier-borne, and because supplies and troops are ship-borne and require surface escort, it was also necessary to establish naval bases as soon as possible.

In 1942 when the Americans started to recover from the Japanese onslaught, they faced an apparently invulnerable foe. Japan was in the centre of an area nearly 3,000 miles in radius within which there were no bases which could offer an air threat except perhaps to the north, where a neutral Russia was in any case too preoccupied with Germany to offer a serious threat. Japanese air power was established on island bases throughout the Pacific, in particular in Micronesia, which constituted a considerable part of her perimeter defences. Under this air cover the Imperial Navy could operate undisturbed over the vast waters of the Central, Western and Southern Pacific, whilst the merchant ships took to Japan the fruits of her conquests, protected by a sea power whose main weapon was the air.

The Japanese air strategy was based on the theory that large numbers of land-based planes can overwhelm the relatively few aircraft which can be brought against them by aircraft carriers. Rapid concentration of the air forces at the threatened point had to be achieved. The main function of the carriers was to act as staging posts for short-range land-based aircraft flying to and from Japanese strongholds. In theory, the aircraft carriers would seldom, if ever, be within range of enemy carrier-borne aircraft, since these would be looked after by the Japanese land-based machines. For these reasons, and because of decisions made by the Imperial Cabinet, the Japanese naval strategy became one of conserving the fleet for defensive purposes, though every principle of strategy demanded a vigorous offensive in co-operation with the other Service arms in order to maintain her conquests. The result was that nearly the whole of the Imperial Navy was destroyed piecemeal. It is interesting to speculate to what extent the defensive role of the Navy may have affected the planning and operation of the air forces.

The Japanese Air Force was organized on the same lines as the American Air Force—that is to say, the naval air forces were controlled and directed by the Navy, and similarly the Army air forces by the Army. In the Cabinet only three Ministers—the Prime Minister, the Minister for War and the Naval Minister—had access to the

Emperor, and of these the Naval Minister had the most influence. The Navy (that is, the surface elements) was relegated to third place in the nation's armoury of air, land and sea power. And the air forces were designed chiefly for attack The attack concept in air circles was so predominant that their aircraft were built with amazing manœuvrability but with no thought to defence. So we have the odd contradiction that the naval and army air forces were designed for attack whilst the surface-craft role was primarily of a defensive nature. Such a contrast in the function of weapons may well have led to confused thinking on the part of the Japanese Naval Staff, for, be it noted, the enemy air power in the Pacific was exclusively naval until about the middle of 1944, when, owing to its many defeat. the Navy was forced to call on the Army Ar Force for aid. The air concept was that by sheer weight of numbers the bombers would swamp the defences and prevail. The fighters, too, relied on numbers, and on manœuvrability, which was obtained at the expense of fire power, armour and robust construction. The result was an unbalanced air force which, though effective in an offensive capacity against light air opposition. was at a disadvantage when forced on to the defensive. General MacArthur* expressed it succinctly when he said, "Jap planes can dish it out. but they can't take it."

The Americans quickly adapted their tactics to counter an enemy already committed to a specific programme of training and production. They had the flexibility and capability for quick, large-scale production. Their aircraft were designed for both attack and defence, and they produced huge quantities of robust fast fighters with a heavy fire power, and dive-bombers and torpedo-bombers, whilst priority was given to the construction of more than fifty aircraft carriers.

The Japanese Air Force had its first check in the Battle of the Coral Sea in 1942, and its first defeat in the Battle of Midway. Air power was the decisive factor in both these engagements, as indeed it was in every engagement in the Pacific theatre, and the enemy surface forces and the escorted transports and troopships were forced to retire. Not a shot was exchanged between the opposing surface craft. They were essentially air duels, each side striving for air superiority over the battle area, which resolved into efforts to sink the opposing carriers and destroy the opposing aircraft.

In such engagements the fighter's primary function was the defence of the carrier from enemy bombers. Such protection was best

^{*} Time, circa January, 1945.



afforded by the disposal of the enemy carriers before his bombers became airborne. So the fighter's primary role tactically was to neutralize the enemy fighters and permit the bombers to attack the enemy carriers unhampered by air opposition. To plagiarize General Forrest, the aim of each air force was "to get there firstest" and, if possible, "with the mostest." Obviously the time factor was of vital importance in such engagements. And once within range the commander had to be mentally alert to an exceptional degree, and make split-second decisions of major importance. Once established, air superiority conferred on its holder the ability to close the enemy with his surface craft, meanwhile subjecting him to constant air attack, though in practice it was rarely that the surface-craft elements came to grips owing to the range at which the aerial engagement was first opened.

In the engagement off Okinawa the American task forces presented the world with a classic example of concentration and timing when carrier aircraft sank the new 45,000-ton battleship Yamato, a cruiser and three destroyers. In this action about 400 aircraft from four different carrier groups assembled within visual distance of the battleship. The aircraft orbited Yamato and an escorting cruiser out of flak range until the signal for attack was given. The fighters went in first with rockets and heavy machine-gun fire to intimidate the flak defences. Close behind the fighters came the torpedo-bombers and divebombers. The defences were swamped, to the extent that only seven aircraft were lost, a small exchange for a battleship, not to mention the other units and probably some 3.000 naval personnel. Japanese air opposition was non-existent owing to the offensive sweep by Admiral Nimitz prior to the engagement. Carriers penetrated the Inland Sea and challenged Japanese home-based air power so successfully that the enemy lost 500 aircraft, and as a result the remnants of his navy.

These engagements were significant in demonstrating that the air had become the predominant weapon in the armoury of sea power; at the same time, however, the air element was an integral part of sea power. The carrier-borne aircraft is entirely dependent on the survival of the carrier. Although it is potentially able to protect its floating base from air attack, it cannot as yet protect it at all times during the day and night and in all weathers from attack by surface warships and submarines. Until aircraft can guarantee this complete immunity from attack the carrier must be escorted by surface craft. The battleship still justifies its existence if only for the protection it affords the carrier.

After Pearl Harbour it was appreciated by the

Allies that the strategic key to the control of the Pacific was the neutralization of Japanese air power in Micronesia. Once this was accomplished, bases could be established in the archipelago from which to launch offensives against the Philippines and Indonesia, with the higher aim of cutting Japan's communications to her conquests; and from Micronesian bases the strategic bombing of Japana could be started.

The American task forces relied entirely on carrier-borne aircraft for air cover—the airfields in Hawaii were too far from Micronesia to allow land-based aircraft to afford air protection. The preliminaries to an assault on an enemy stronghold were nearly always of the same pattern. Firstly, local air superiority had to be achieved and to this end the enemy reserve aircraft centres for the Allied objective were subjected to heavy and concentrated attack. Reinforcements were thus prevented from streaming to the threatened island base. Simultaneously the base itself was strafed by fighters and bombers, whose primary targets were enemy aircraft, grounded or airborne. The Japanese were either shot out of the sky or destroyed on the ground. With air superiority achieved over the assault area, the troopships and transports could move inshore and deploy the assault troops, whilst the escorting warships bombarded enemy strong-points on the shore. Meanwhile, the aircraft turned their attention also to enemy strong-points, such as pillboxes, coastal guns, fuel dumps and communications and troop concentrations.

Finally, the assault troops moved on to the beaches under cover of the air umbrella and closely supported by the aircraft when necessary. The fighting, especially on the ground, was bitter and bloody, and in the earlier assaults the Allied casualties were heavy, yet they succeeded in seizing their objectives. As soon as resistance ended an air base was established from which to attack other islands, this time, however, using landbased and carrier aircraft; and from these permanent, unsinkable bases Allied air power was exercised to neutralize the enemy air power on such strongly defended positions as Rabaul and Truk. The costly business in lives and material of assaulting these strong-points was in this manner avoided, and made unnecessary. By obtaining air superiority over Rabaul and Truk, the use of these bases was denied to enemy warships, which therefore could not threaten Allied supply lines by sea or air weapons.

By the island-hopping technique bases were established at places such as Tarawa, Kwajalein, Eniwetok, Makin, Hollandia, Biak, Morotai, Saipan, Guam, Leyte, Luzon, Iwojima and Okinawa.

The seizure of Saipan marked the close of the first phase of the American offensive. The B29's moved in and added weight to the strategic bombing offensive which had opened on a small scale with attacks on Japan by 20th A.F. Super-Fortresses based on Chengtu.

Japan is 1,200 miles to the north of Saipan. The long trip across water had the one advantage that it was not over enemy territory and the bombers were untroubled by flak. But owing to the great distance, fighter escort was out of the question, and enemy fighters had to be dealt with by the bombers themselves. Fortunately, the high ceiling of the B29's made it difficult for the Japanese fighters to intercept. Moreover, the enemy radar equipment was poor and in short supply, and very short warning, if any, was obtained of the approach of the Super-Fortresses.

The naval engagement which followed the assault on Saipan was significant because it upset still further the Japanese concept of air strategy. A Japanese carrier task force set out from north of the Philippines to relieve the beleaguered enemy garrison. The intention was to dispatch an endless flow of aircraft from the numerous permanent airfields in the rear of the carriers, which were to act as staging posts, and thus permit the reinforcements to attack the American forces. These aircraft would then fly on to islands in the neighbourhood of the battle, or to Saipan itself, and refuel and rearm. The Japanese carriers would therefore be out of range of the American aircraft. But the Americans had a large number of carriers. Some of them moved to the Bonin Islands and attacked the Japanese aircraft reinforcement centres. Another force continued the assault on Saipan, and a third group steamed for the Japanese carriers, which were forced to retire after an abortive effort.

The greatest defeat for the Japanese Air Force, however, was during the landings at Leyte, Mindoro and Luzon in the Philippines. In the softening-up phase prior to the Leyte landings, Allied carrier aircraft struck at the enemy air power from the Ryukyus down through Formosa and into the Philippines and destroyed some 800 aircraft in twelve days. Concurrently, strategic bombers form Saipan and China attacked air bases in Formosa, and aircraft based on Palau and Morotai ranged over the Southern Philippines and the East Indies. These attacks served to disrupt the flow of reinforcements to the threatened points, and left the American task forces to deal with the temporarily isolated enemy air power around Leyte, which was quickly neutralized.

Amphibious forces landed and it then became a race between the preparation of air strips on

Leyte and the arrival of reinforcements from Japan. Tacloban air strip was finished in four days by the homeric efforts of aviation engineers, just in time for more than fifty aircraft to make emergency landings, as their carriers had been sunk or damaged by the newly arrived reinforcements from Japan. But after a short and bitter struggle the Americans re-established their air superiority, mostly with P38's, and shortly afterwards, when amphibious forces landed at Lingayen Bay on Luzon, only two Japanese fighters offered opposition from the air.

With secure bases in the Philippines Allied air power was able to dominate Japan's supply lines to Southern China, Thailand, Burma and the East Indies. Long-range aircraft could patrol the South China Sea and locate and attack enemy merchant shipping. Surface craft and submarines could operate with little interference from enemy aircraft and none from his warships. Naval units could be based on Cavite, for Allied air power could guarantee them protection from enemy attack.

Then came the seizure of Iwojima as another base for the strategic bombers and one close enough to Japan to permit long-range fighters to escort the bombers. Moreover, its seizure removed the threat offered by Japanese fighters to the strategic bases at Saipan. Lastly, reconnaissance planes could thoroughly photograph the Japanese coast, a task unsuited to the high-flying B29's owing to frequent and extensive cloud formations over Japan. The Japanese could not be sure whether the final assault would come direct or through the Ryukyus, the Kories or from China or Korea. They could not be strong at every point of attack and were obliged to spread their defences thinly or concentrate on likely points of attack. Only by air photography could we obtain reliable information about their dispositions.

With bases in China and the Marianas and Iwojima, the strategic bombers could begin to deliver really heavy attacks on Japanese industry. First priority targets were the aircraft factories around Tokyo, Nagoya, Okayama and in Formosa, for the Americans did not underrate the threat of the enemy fighters. It is fairly certain that the Japanese were concentrating on the production of fighters for the defence of the homeland against the anticipated final assault by the Allied armies. Their new fighters were faster and had a much greater ceiling and fire power than contemporary models, and several of them were in the 400-mile-an-hour class. Three-quarters of the aviation industry was concentrated on fighter production at this time. Even more significant, 80 per cent. of the entire monthly aircraft

production went direct to the operational units, as the enemy's reserves were practically non-existent.

The strategic bombers could expect stiffening air opposition unless they could reduce aircraft output to the extent that the Japanese air losses could not be replaced. In this protracted battle the Allied aircraft still had a margin of technical superiority, though it was not so great as was evident a year before the main strategic offensive started. But probably the greatest handicap to the Japanese was their marked inferiority in radar equipment and their acute shortage of radio technicians. One of the decisive factors in the Battle of Britain was the superiority of British radar, which enabled the R.A.F. to intercept without the waste of standing patrols.

When the American and British task forces attacked and occupied Okinawa, the island became a base which served a twofold purpose. It is 500 miles from South-West Japan and therefore the strategic bombers could operate with fighter escort. But its immediate importance was that it enabled the Allied air power to strangle Japanese supply lines, already gravely embarrassed by air and sea power operating from the Philippines. Between Okinawa and Shanghai, 500 miles distant, ran the main Japanese trade route to the Formosa Straits and the southern conquests. Allied air power established air cover over the Pacific and East China Sea from Iwojima and the Marianas to Shanghai, and with the aid of warships and submarines, and by mining, isolated Japan from her conquests and armies

Let us turn from the spectacular use of air power in the Pacific and examine its rolle in Burma. There the Japanese Army Air Force gave air cover to the Japanese Fifteenth Army, and the Allies were forced to retreat to the borders of India. The Burma Road was cut, and supplies to China and to General Chennault's 14th A.F. based in Huan had to be flown over the famous hump. Gradually, whilst the Fourteenth Army held the enemy at the Indian frontier, Allied air power started to build up, and to make its weight felt. The Japanese had enormous difficulty in maintaining supplies through a country with poor communications, and depended to a large extent on air transport. Their air forces were imperfectly trained and units were withdrawn for further training at frequent intervals. Allied tactical bombers strafed their airfields and grounded aircraft whilst our fighters sought air superiority over the battle areas. Gradually the Japanese fighter strength was reduced, and the Allies obtained the coveted air superiority, and with it the initiative. Now the Fourteenth Army could advance, closely supported by tactical aircraft, whilst long-range bombers attacked the Japanese communications to Rangoon and Bangkok and the 14th A.F. in Hunan harried the supply lines to Siam and Burma. But the remarkable feature of the advance was that the Fourteenth Army was supplied almost entirely by air transport. Because there are no roads in this mountain region there was, in fact, no other way to bring up supplies. Unarmed transports either dropped supplies by parachute or landed in jungle clearings hastily built near the front line. Such operations were possible only with the absolute air superiority maintained by the fighters. Lord Louis Mountbatten paid a tribute when he said in a message to the Cabinet, "These great land advances have only been made possible by the untiring efforts of the airmen."

The successful tactics initiated by General Wingate were made possible with the aid of air power. His Chindits were dropped in the enemy rear to harass communications, and were supplied by parachute from transport aircraft. Many of his wounded were evacuated by air, as indeed were the casualties of the Fourteenth Army itself.

Throughout this long and bitter struggle the strategic bombers based on India and in Hunan struck ceaselessly at the Japanese supply lines. The net result was announced on 7th April, 1945, when the S.E.A.C. communiqué stated that the Japanese Fifteenth Army was in flight, and that the British Fourteenth Army was deploying to attack Rangoon. When Rangoon was recaptured supplies could be brought in by sea, and thus large fleets of air transport were released to augment the flow of supplies to China, over the new Burma Road, reopened with the occupation of Lashio by the Fourteenth Army.

The operations in Burma present a striking example of the decisive nature of air power. Conversely, the ancillary operations of General Chennault's 14th Air Force demonstrated its limitations. With bases in Hunan the bombers harried the enemy supply lines. General Chennault relied on the Chinese for protection of these bases, but when the Japanese Army advanced, the Chinese offered little resistance. The 14th Air Force did its utmost to stop the Japanese Army, but was unsuccessful, and was forced to retire from the airfields, which were quickly occupied by the enemy.

With Burma reoccupied, the Allies quickly sought and established air superiority over Thailand and Indo-China, and with the aid of the Philippine bases cut enemy communications through the China Sea. Japanese forces in the East Indies, Siam and China were isolated and

deprived of air cover as a preliminary to assault by land forces. Japan herself was greatly weakened by the denial of raw materials from her conquests, and by the continuous attacks of the strategic bombers. The time was nearly ripe for the final assault on the Japanese mainland.

The limiting factor in the weight of attack which could be delivered by the strategic bombers was the scarcity of suitable sites for airfields within bombing distance of Japan. There were more than enough bombers available when Germany was defeated, but unfortunately there were

few bases to operate them.

And then, on 5th August, 1945, Hiroshima was destroyed by an atomic bomb, the destructive powers of which were estimated to be the equivalent of 20,000 tons of high explosive. The Japanese were faced with the choice of immediate surrender or annihilation. To spur the decision, an atomic bomb was dropped on Nagasaki on 8th August, and the enemy surrendered unconditionally on 10th August. The assault on the Japanese mainland was unnecessary; the bomber had administered the coup de grâce as Seversky had always maintained that it could.

Nevertheless, when planning their air strategy for the Pacific campaign, the Allies could not afford to rely on the unknown potential of the atomic bomb, however cataclysmic it might in fact prove to be. If it did fulfil the scientists' expectations, so much to the good. If it failed, the original and current plan to take Japan by a

combined asasult could proceed.

By July, 1945, the island-hopping technique had brought the Allies to the stage when the assault on the Japanese mainland was an event of the near future. Japanese air power was on the wane, owing partly to its own inherent weakness of inferior training and aircraft, and lack of harmony between the Japanese Army and Navy Air Forces resulting in operational inefficiency.

It would have been necessary to provide bases for the tactical air forces in support of the assault troops, and for effective support such bases would have been within 200 miles of the front line. Probably a large part of the tactical air forces would have operated from carriers. Early in 1945 the Americans* launched the first

of five carriers each capable of operating eighty twin-engined bombers, which are most suitable for tactical support.

The strategic bombers had written off Tokyo, Nagoya, Kobe, Yokohama and Osaka from their list of targets. They would have assisted the tactical aircraft to a certain extent in the campaign of interdiction, softening up and isolating the area for assault. But the majority of the targets would have been suitable only for tactical aircraft, which in any case would have had the task of securing and maintaining absolute air superiority over the assault area.

Yet all that such a stupendous effort could have achieved was more than equalled by two atomic bombs, and without any loss of life on the

Allied side.

No praise can be too high for the brilliant victories of the American flyers and operational staffs. They confounded Seversky by demonstrating that carrier aircraft can compete with landbased aircraft. They confirmed that quality in air power is more important than mere numbers. Every advantage was quickly taken of technical developments. They proved that air forces can be made mobile strategically by the judicious use of carriers and escort vessels. And, finally, they maintained an aggressive offensive policy which never allowed the enemy to recover from his defeats.

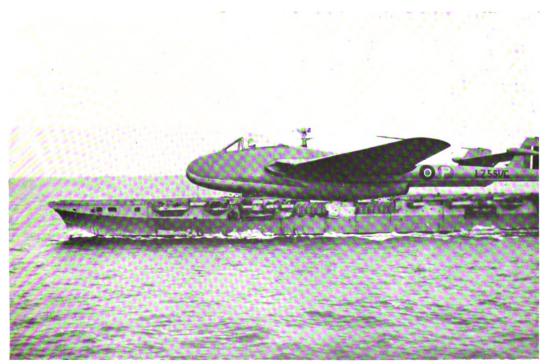
In all the amphibious operations in the Pacific. air power, sea power and land power were so closely associated that it is extremely difficult to distinguish the divided line between the three Service arms. Combined operations in the highest degree, the Allied war potential was expressed most ably by Sir Frederick Sykes when he defined it as belligerent power. But air power was the predominant factor. Apart from the strategic assault on Japan itself, the fundamental issue in the Pacific was control of the seas, for with that control the Allies could maintain their bases and accumulate supplies for the next assault, and could deny the seas to the enemy merchant ships and navy; and control of the seas is automatically bestowed on the side which controls the air above.

^{*} Time Mag. (Daily Telegraph), circa February, 1945.



VAMPIRE leaving H.M.S. "Ocean"

[Photo: Charles E. Brown

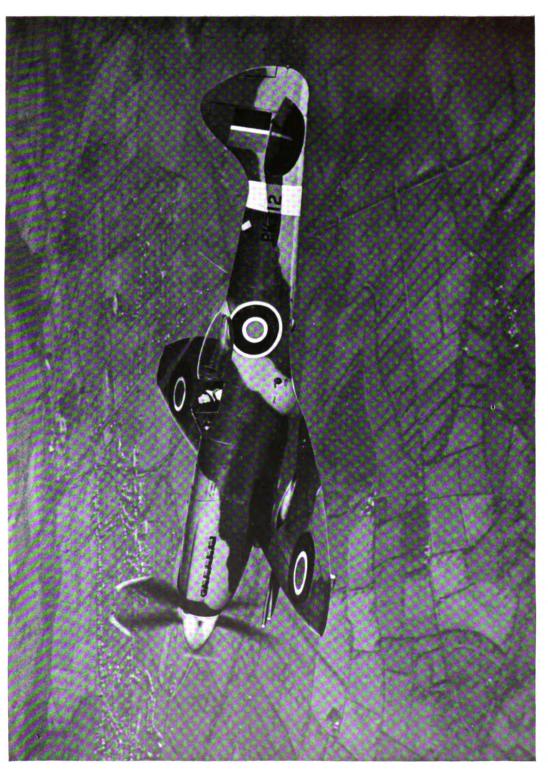


VAMPIRE

[Photo: Charles E. Brown



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The Role and Control of Transport Aircraft

By GROUP CAPTAIN C. RYLEY, D.F.C.

Introduction

• 1. In this paper the intention is to review the roles of transport aircraft in war and in peace, and, in the light of experience gained during the past five years, to decide the most economical and effective method of "controlling" (in the sense of operating and administering) these aircraft.

Roles of Transport Aircraft in War

- 2. There are four main roles which may be allocated to transport aircraft in time of war. They are:
 - (a) Employment to help in winning and maintaining air superiority.
 - (b) Direct air support to the Army's battle.
 - (c) Air lines in the operational zones.
 - (d) Essential trunk route air lines (until the air position allows the return of civilian operators).

WINNING THE AIR BATTLE.—3. All three Services agree that no land battles and few sea battles can be won if the air battle has not first been won. It is quite safe to say, therefore, that the first commitment for transport aircraft must be to ensure the gaining and maintaining of air superiority.

4. Had transport aircraft been available in a rational proportion to other aircraft in the early days of this war they might well have had a decisive effect in many campaigns. In the desert, in Greece, and even in the Battle of Britain, the movement and provisioning, and hence the flexibility, of squadrons were frequently tied down to

the speed of M.T., ships and trains.

5. The air arm is inherently the most flexible striking force, and it is an anachronism to hamper its immense potential by fettering it to slow and unwieldy methods of transportation. A sufficient force of air transport aircraft must therefore be available immediately to "lift in" such units as are required, with their full equipment and personnel, together with bombs, ammunition and petrol if necessary, so that they may become operational at destinations within a few hours instead of a few days or weeks as has been the case. Road, rail and sea communications are all limited in varying extents by geography. Trains can go only where rails can be laid, M.T. where the ground surface permits, and ships where the depth of water, sheltered anchorages, etc., allow, and all, for these reasons which limit their mobility, are highly vulnerable to air attack. When therefore it is required to operate an air base from some remote location, the use of these cumbersome and vulnerable methods of transport cannot be tolerated.

6. Once, of course, the slower transportation becomes available to build up bulk storage, the air transport formations can be withdrawn to

carry out other similar operations.

7. It should thus be possible for an air commander to deploy his entire striking force to unprovisioned landing grounds up to 1,000 miles from their base airfields, and operate them at intensive effort from their arrival. When the air battle is won, the transport aircraft can be released to other roles, subject, of course, to their immediate reavailability in their primary role.

DIRECT SUPPORT OF THE LAND FORCES.—8. If the fruits of the air battle are not to be lost, the land forces must occupy and consolidate hostile territory, organize L. of C., and make safe new air bases for further offensives. As soon, therefore, as the air situation allows, all possible transport aircraft must be utilized in direct support of the Army. These operations involve:

- (a) Transport of paratroops and glider troops to dropping zone.
- (b) The resupply of these troops until ground L. of C. are established.

(c) Landing or evacuation of troops.

- (d) Landing or dropping of all supplies and equipment required by land forces, over long periods, where no L. of C. exist. (Once, however, L. of C. do become available, this uneconomical use of aircraft is indefensible.)
- 9. In any or all of these operations the employment of adequate numbers of aircraft is a vital factor, and therefore all considerations other than the maintenance of air superiority must give way to allow the maximum force of aircraft to be deployed.

AIR LINES IN OPERATIONAL ZONES.—10. When the needs of direct air support have been met, the local air commander will probably find it necessary to operate some proportion of his force to carry urgent freight and personnel required to move generally within his zone. Transport aircraft will be backed up by his communication squadrons while the latter are fulfilling their primary role of carrying senior staff officers of the three Services.

11. The air commander will normally consult the heads of the other Services on their local requirements in air lift, and will allot certain transport units to run these air lines. They would, however, be withdrawn from this work should the needs of the air or land battle make it imperative.

TRUNK ROUTE AIR LINES.—12 In the same way that our Merchant Navy provides our ocean transport, so it is axiomatic that civil carriers should operate our main air routes. When, however, their proximity to operational zones makes civil air lines too hazardous, these routes may temporarily be operated by Service aircraft, but this misemployment must cease as soon as the air situation is modified.

Role of Transport Aircraft in Peace

- 13. If we are to be prepared to strike quickly and effectively in war, the Air Force must be provided with a reasonable backing of transport aircraft in peace. Their training for their war role would, in fact, be more productive to the Royal Air Force in general than that of any other type of squadron. It would consist of:
 - (a) Exercises in Mobility.—R.A.F. squadrons and other units would be transported in these exercises, and would themselves gain valuable training in mobility.
 - (b) Exercises in all forms of Airborne Operation and Army Support. Exercises would be tied in with scheduled Army movements.
 - (c) Maintenance in Flying Practice.—General airmanship in all weathers would be practised by:
 - (i) Running local air lines for the transportation of R.A.F. personnel and equipment both in and out of the command.
 - (ii) Running certain Service air lines to remote outposts of any fighting Service. These air lines would carry personnel on posting and leave, and also bring in fresh meat and vegetables, as is the present practice in the Persian Gulf.

Note.—Apart from operations, exercises and Service air lines, all Army and Navy personnel would normally travel by civil air lines (when not moving in their own media). Senior officers of all Services would, as in war time, have a call on communication aircraft when necessary.

(d) Local Operations.—Even when the world at large is in a technical state of peace,

the British Empire will always be faced by minor crises and incidents such as the Kabul evacuation, etc., and in these diversions the local transport group will obtain splendid training, and at the same time perform invaluable service.

Policy for Transport Operations. — 14. Policy for the operation of transport aircraft, as in other branches, would be collated and issued by a Director of Transport Operations at the Air Ministry. This would ensure unified policy and practice.

Control of Transport Aircraft in War

15. The operation of transport aircraft in war would follow Air Ministry policy, but would be the direct responsibility of the local Air C.-in-C., who would win his air battle and then employ his full resources, transport and others, to the best advantage of the other two Services.

FLEXIBILITY OF COMMAND FOR MAJOR TRANSPORT OPERATIONS. — 16. The whole striking power of air forces depends upon their mobility and flexibility, and therefore if a major operation was scheduled for one theatre it would be normal for the Air Ministry to withdraw the majority of transport aircraft from all or selected commands, and place them temporarily under one Air C.-in-C. to achieve decisive results in one theatre.

Transport Operations within Commands.—17. All transport operations within the command would be executed by the Transport Group Commander. He would hold an identical position to the bomber and fighter group commanders, and would base his tactics on the "papers" issued by his director. He would act as transport adviser to the Air C.-in-C. (The Air C.-in-C. would maintain a transport operations section in his air staff.)

"COMPOSITE" GROUPS AS APPLIED TO THIS PROPOSAL.—18. The success of the "composite" group in overseas operations argues a good case for its general adoption, overseas, for both peace and war.

19. If this principle is agreed we would have the main overseas commands controlling geographical "composite" groups. Each group would contain all of, or any of, the following types of squadrons as required:

- (a) Bomber squadrons.
- (b) Fighter squadrons.
- (c) Transport squadrons.
- (d) Reconnaissance squadrons.
- (e) Miscellaneous units.

The group commander would then have on his air staff officers specializing in fighter operations.

bomber operations, transport operations, etc. In many ways this set-up would provide the greatest flexibility possible for the overseas type of campaign.

TRUNK ROUTE AIR LINES IN WAR. — 20. Whilst the Air Force is forced to operate such trunk routes it is preferable that the services should be organized and scheduled centrally from England. As the Air Ministry cannot take operational control, it is necessary to have some formations about the size of a group whose sole function is to operate the trunk air lines. Whilst this formation remained in existence it would control its aircraft and air crews so as to maintain uniformity of experience and equipment over long flights. All ground administration, maintenance, accommodation, etc., would be provided by the air commander in whose territory the bases lie.

- 21. As commands gain experience in the operation of, and provision for, transport it should be possible to reduce the operating formation in England to something in the nature of a wing (or base on the Bomber Command pattern), whose functions would be to provide:
 - (a) Base maintenance facilities for aircraft.
 - (b) Base facilities for air crew, covering their operational efficiency, special medical requirements, accounts, honours and awards, etc.
 - (c) Operations staff to work schedules.
 - (d) Passenger handling facilities at English terminals.
- 22. As soon, however, as the air situation allows, civilian carriers must assume full responsibility for operating and maintaining their aircraft, provision and training of air crew, and handling and accommodation of passengers.

Control of Transport Aircraft in Peace

23. The control of transport aircraft in peace would be precisely similar to that advocated in war, except that the trunk route formation in England would disband.

Note.—It might be advantageous to keep a "cadre formation" operating on trunk routes which would keep up to date on civil practice and run "special" long-range flights for royalty, Cabinet Ministers and members of the Air Council on tour.

Training of Transport Air Crew.—24. The training of transport air crew is as specialized as that of bomber and fighter crews, and special provision must be made for such training in Training Command.

25. Air crew, once they have learnt their job, should not remain screened and, within the

bounds of general service efficiency, would be given an opportunity to gain proficiency in all arms of the Service in accordance with normal Royal Air Force practice in peace time.

Objections Raised in the Past to these Proposals

Theoretical Advantages of Functional Command

- 26. It has been said that, to achieve maximum uniformity, and thus the maximum flexibility and mobility, the operations of transport aircraft should be directed by a functional command who would be responsible for:
 - (a) Unified methods of operation.
 - (b) A unified system of flying control throughout the world.
 - (c) The true flexibility that is said only to be possible under unified command.

Centralized Control in Practice

27. In practice it has been found that centralized control of operations, over vast areas of the world, is not practical and that it must be left to the "commander on the spot" to decide, in the light of this local knowledge, and advised by his local transport group commander, what form the operations shall take.

Area Flying Control

28. Flying control methods must be uniform for air crew flying round the world, but now that the mystery in which Transport Command originally shrouded area control has been dispelled, Air C.-in-Cs. and their staffs are finding little difficulty in understanding the "hoodoo" and, once certain equipment difficulties have been overcome, a first-class system should exist throughout the world. It should have the further advantage that the local commanders will feel a more personal responsibility for it than if it were the baby of some command 15,000 miles away.

Tactical and Strategical Flexibility

29. With regard to flexibility, it is true that unified control gives the greatest flexibility, but we have always thought in terms of very small forces, where no one force was sufficient for its task without immediate reinforcement. We must now begin to think in terms of self-sufficient "air fleets" comprising all arms, and able to compete with all normal operations in their territories. These fleets will possess far greater tactical flexibility if they are not required to refer to any remote formation prior to operating their aircraft. We would maintain strategical flexibility, however, by the power of the Air Ministry to attach any number of transport units, temporarily, from one fleet to another.

Conclusion

30. (a) The primary role of transport aircraft in the Royal Air Force is support of the air and land battles in war, and training for that work in peace. Furthermore, these aircraft should only be committed to general air line operations to the minimum extent in war and emergency, and not at all in peace.

(b) Now that the operation of transport aircraft is generally understood throughout the Royal Air Force, we can well return to the normal practice (outside England) of geographical commands and groups advised by specialist directors. It is, therefore, no longer economical or advantageous to retain a functional command.

THE PRIZE ESSAYS

A SUMMARY

SUBJECT No. 1

The Commonwealth and Empire Air Forces and Allied Air Units at present serving with the Royal Air Force are fully integrated with the latter. They are organized, trained and operated on an almost identical basis. How far can this close integration in its present form be made a common object of our policy and contribute to the carrying out of projects for securing peace?

THERE was general agreement upon the main principles involved in the problem of integration. First, unity of command is essential in war, but neither possible nor desirable in peace. Second, regarding the organization, two principal alternatives were considered: either one united force, organized, controlled and administered as a whole, or a number of separate forces, organized and trained on similar but not identical lines, and capable of co-ordinate action at any time under a single war-chief. Here a very important factor has to be taken into account: the individualism of nations, including that of the Dominions, which tends to separation after a war when there is no longer a "common enemy." The Royal Air Force was a model of integration, consisting as it did of squadrons of many different nationalities; but that cannot continue in peace. The allied nations and the Dominions naturally want to have their own separate air forces, however similar they may be to that of the United Kingdom.

Nor is this to be deplored. Complete unity of forces is not desirable, even within the British Commonwealth of Nations. Differences there must be, and they are valuable; but unity of planning at the top and mutual understanding and co-operation lower down will give the kind of integration necessary to efficiency. The Dominion air forces are now sufficiently developed to stand upon their own feet and operate independently of the Royal Air Force. If there

is any suspicion that the Royal Air Force may wish to dominate the air forces of the Dominions, that suspicion must be allayed promptly. Dominance is not the word. If the Royal Air Force is the model and prototype of all British air forces, these will naturally model themselves upon it and, for the sake of coordination, conform generally to its principles and customs; but that is not dominance. There need be no slavish imitation. Differences are valuable; and the Imperial Air Force of the future will be all the more efficient on account of the variety and flexibility of its parts. This, it was pointed out, reflects the principles of the Statute of Westminster (1931), in which Dominion Status was defined with some precision. Dominion Status entails certain freedoms, e.g., freedom of action, freedom in foreign policy, freedom to accept or refuse a share in common defence policy. This too is an advantage, for the experience of the Ottawa Conference (1932) shows that the formation of a common defence policy for the whole Empire and Commonwealth might cause grave suspicions among other nations that we were trying to form a military bloc.

What is needed is "a plan that involves a minimum of centralized control in peace and a maximum capability of joint action in war." Such a plan would have to be evolved by a Joint Commission of representatives of the United Kingdom and the Dominions and of any foreign nations whose air forces it may be proposed to integrate with those of the British nations, either by way of a Regional Agreement or for joint enforcement action in support of the Security Council under the Charter of the United Nations.

The Joint Commission would recognize with satisfaction that all the Dominion air forces are modelled on the Royal Air Force and might even recommend a similar organization

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to any other nation willing to adopt it. It would also suggest how efficient liaison could be maintained, how the results of individual research and technical development could be made available to all, and how the most efficient co-operation could be ensured in a grave emergency. Research and development should proceed in the United Kingdom and in each Dominion (and allied country) separately along independent lines; but results should be communicated by each to all and a Central Research Establishment should be set up to deal with the bigger problems on behalf of all. Standardization, while making servicing and navigation simpler and easier, should not be applied too rigidly. Variety gives flexibility and versatility, which are invaluable qualities in an air force. There should also be adequate liaison in tactical developments, intelligence, training and administration, with a Central Liaison Staff to act as a clearing house. The work of the Central Research Establishment and of the Central Liaison Staff should be co-ordinated by a Co-ordinating Advisory Council, which should exercise no control over the separate air forces but be, like the research and liaison establishments, a servant to them all. A Central Flying School, Central Air Armament School and Central Meteorological Establishment for all British air forces might be advantageous as supplementary to and coordinating the work of similar establishments in each Dominion (and co-operating nation). In order to ensure mutual understanding and efficient co-operation between the individual members of the several air forces, frequent exchanges of individual officers and airmen should take place on a generous scale. And to allay suspicion, foreign powers might be invited to send air attachés separately to each of the Dominions, and the Dominions themselves might advantageously exchange air attachés.

Thus we should have separate air forces, similarly organized, developing along similar lines, co-ordinated but not integrated, yet capable of complete integration almost at a moment's notice. Such a system would provide a highly efficient force, varied and flexible, ready to be controlled and directed by a supreme commander who would be appointed only when an emergency arose. (An excellent diagram illustrating these proposals is contained in Sergeant J. Glenn's prizewinning essay on page 75 of The ROYAL AIR FORCE QUARTERLY for March, 1946, to which we refer our readers.)

The foregoing applies principally to the problem of integration of the air forces of

Great Britain and the Dominions, but the problem of integration of air contingents of various nationalities for international enforcement action is almost the same. There would, of course, be greater differences, e.g., differences of language, differences of organization and differences of temperament and outlook. But these would be far less troublesome in separate squadrons and formations than they would be among individuals in the same squadron or formation; and they could be greatly reduced by generous exchange of personnel in peace-time, as has already been recommended. Moreover, if the Dominions participate in Regional Agreements with other nations in their own regions, as seems both probable and desirable, there will be integration of British and foreign air forces for mutual defence and support; and this would be, on a small scale, what an integrated International Air Force would be if called out in support of the Security Council.

A few considerations that have not been fitted into the foregoing summary:

There is only one way in which an unquestionably International Air Force could be formed, on whose loyalty, efficiency and immediate readiness the Security Council could unhesitatingly rely. It must be a corps d'élite, inspired by pride and devotion to the service of humanity and dedicated to the task of protecting humanity from another world war. The highest possible standard must be set; it should be regarded as one of the most honourable and exclusive careers; pay, amenities and social standing should be high; and with these attractions there would be no dearth of volunteers in every nation, from among whom each nation would select its own contingent. These contingents should then be posted to an International Air Force Training Wing in a climate suitable for all-the-year-round flying. Here they would be trained and get accustomed to working with other national contingents, and a fine esprit de corps would develop. Meanwhile, as this will take time to perfect, we have the Royal Air Force—the only "independent air force" among the Big Three—available as the core and nucleus of a temporary world air force—to be joined, if possible, by the air corps of the U.S.A. and the U.S.S.R. and others. But as soon as our proper International Air Force is ready, with all its national contingents trained and co-ordinated, it should take over responsibility for enforcement action under the Security Council; and having been created and trained for that particular function, should be a most efficient instrument.

SUBJECT No. 2

Mobility is an essential element in the defence of the widespread commitments of the British Commonwealth of Nations and Empire, and for combined international enforcement action. Discuss the part that air forces might play in these spheres and the effect that the proposals might have on the existing responsibilities of the three Services.

It was right and proper to begin by pointing out the analogy between air power and sea power, since both depend upon bases judiciously placed throughout the world to act as pivots for the operation of air formations and fleets. With the necessity for, and methods of organizing, naval bases our commanders and potential commanders have long been familiar, and this knowledge and experience can easily

and quickly be applied to air bases.

Now, however well provided with bases from which to operate, a fleet is rendered very largely ineffective in the face of hostile aircraft and submarines unless it has itself strong enough air cover to deny the sky to enemy aircraft and to detect and help to destroy enemy submarines. Air cover has also been found to be necessary to the movement and operation of land forces and will become even more important to them in the future. Aeroplanes are still the most efficient means of conveying atomic bombs and other projectiles long distances to their objectives beyond the range of ordinary artillery. And because the British Empire is so widely dispersed, air power is more valuable to the British Empire than to any other nation or group of nations. If the existence of the British Empire formerly depended upon sea power, it now depends upon sea power plus air power; and sea power itself depends upon air power. It was air power that saved Great Britain in 1940. Hence security of air bases, as formerly of sea bases, is a first essential.

The main air base of the Empire during the last war (1939-45) was Great Britain. But the British Isles are singularly vulnerable by modern weapons, and a surprise attack might easily put the whole country out of action. Since the invention of the atomic bomb, the British Isles have become indefensible. Thus, it is argued, the "centre of gravity" of the Empire must be shifted out of Great Britain and established in some place much further removed from danger. Canada is an obvious suggestion, but there are others. For similar reasons it is desirable to disperse the industries of the Empire and its population. The present distribution is roughly fifty millions in the British Isles and twenty millions in the Dominions. It is suggested that the following would be a far better distribution for strategical reasons: British Isles, fifteen millions; Australia and New Zealand, fifteen millions; South Africa, ten millions; Canada, thirty millions. Thus each Dominion would become a self-contained naval and air base, and the British Isles an advanced base instead of the only base. In these circumstances, and with a close alliance with the United States, the Empire would be impregnable, whereas at present, "by blotting out the British Isles, a war against the Empire could be won at one blow without fear of comparable retaliation."

That brings us to another important point noticed in the essays. There is no defence against atomic weapons except retaliation. Only by a perfectly successful surprise attack can a nation that takes up the atomic weapon hope to escape retaliation, and even so it can never be sure there will be no counter-attack when, years later, its victim has been revived and restored. Apart then from a perfectly successful surprise attack, "any war with atomic weapons between great powers is lost by both sides whoever wins it technically"; for the devastation of both will be stupendous. Nor is the damage and loss merely material. Social disintegration invariably sets in after a catastrophic war. The social disintegration in Germany after a war waged with pre-atomic weapons is tremendous. How much greater would it have been if the war had been waged with atomic weapons? And what would have been their effects on Great Britain? The British Isles are a singularly tempting target for atomic aggression. "Remove this bait and who would think of beginning atomic war?" Therefore we ought so to deploy our air and other forces throughout the Empire as (a) to reduce the vulnerable target (the British Isles) and (b) to command the territories of all our potential enemies, the natural dispersal of our own overseas territories being singularly advantageous for this. A series of well-established, self-contained imperial air bases, judiciously sited for strategical and tactical purposes, capable of independent action and of supporting one another, could threaten almost any possible adversary. Thus by dispersing our own forces we can break up enemy concentrations, just as Lee did by sending Jackson to threaten Washington in the Shenandoah Valley Campaign in 1862; and war might even be averted by the possibility of attack from any one or more of many unexpected quarters. The same principle would apply in international air enforcement action under the United Nations.

Another essential function of air forces is,

and will be for a long time to come, the protection of shipping, especially cargo ships, and the destruction of the enemy's. As ranges become greater, shore-based aircraft will displace carrier-borne aircraft for this purpose. And whatever may be the function of the battleship, it can now be immobilized from the air. Armies too will become more and more dependent upon the air arm for transportation, supplies, tactical assistance and air cover. While sea and land forces are and will remain essential parts of a fighting force, "the main responsibility for defence and attack will rest with the air forces in the future to an even greater degree than at present."

Now the essence of successful air operation is mobility. But air forces are not inherently mobile. Their mobility becomes nil as soon as they run out of petrol. Thus they need bases, like naval forces, only more of them. So we are repeatedly brought back to the question of bases, around which the whole subject seems to revolve. Bases are not, of course, the whole answer, but the finest air strategy and tactics are dependent upon bases for their success. What then are the requirements of a good Imperial Air Base? The following are suggested: It should be (1) spacious enough for adequate dispersal of air-fields, personnel and supplies; (2) secure from invasion; (3) reasonably healthy, and (4) self-contained for industry, accommodation (families) and social life. The British Isles themselves, it has been pointed out, form an ideal air base in all respects except (2). Suggested locations for the principal Imperial air bases are: the British Isles (as an advanced base), the Middle East, South Africa, Canada, Australia and New Zealand, and India. In order to ensure efficient mutual support, a certain degree of standardization of equipment and training are essential. Within these base areas there should be integration and balance of forces, and the activities of the whole should be co-ordinated by the Chiefs of Staff Committee. Too much diffusion within areas is to be avoided, but each should contain a dispersed series of integrated and concentrated air forces, each with its own main and subsidiary bases. And since rapid reinforcement is the key to successful air operation on an imperial scale, civil air routes and aircraft should be carefully nurtured, as these will be our military reinforcement routes and our potential troop and supply carriers.

As has been pointed out already, the problem of international air enforcement action is much the same as that of imperial defence. Air strategy and tactics are the same, and both require offensive action, or the threat of it. International air enforcement action will normally take place in two stages, first by local air forces and afterwards by an international air force using local air bases. To ensure efficiency in the latter, all bases should be capable of servicing all the aircraft likely to use them in these circumstances, and much delay in commencing the second stage could be avoided by previous planning.

A few considerations that have not been

fitted into the foregoing summary:

1. Aircraft operating with fighting ships or land forces effect a great economy in fighting ships and land forces.

- 2. Strategical bombing can be carried out from great distances, but tactical air forces must be based as near the battle as possible. Hence carrier-based aircraft would be more useful in any war against a European or Asiatic power, especially if the British Isles were lost. Aircraft carriers are very mobile.
- 3. Of the four tasks of the Royal Air Force in war, namely, (a) strategic bombing, (b) defence of bases, (c) cover, reconnaissance and air support, and (d) transportation; the first, strategic bombing, is the true function of the air arm and with atomic bombs it may prove decisive.
- 4. Air forces based on major bases in Great Britain, the Middle East and India could cover all the European and Asiatic industrial areas except Japan.
- 5. Field-Marshal Montgomery said: "No major offensive can be successful unless the air battle has already been won."

Subject No. 3

Discuss the effects that the rocket (including all rocket-propelled projectiles) and pilotless aircraft are likely to have on warfare generally and the extent to which they are likely to affect the defences of the British Commonwealth and Empire and the international air contingents envisaged above.

As was to be expected, the essays on rockets and rocket-propelled projectiles produced some astounding revelations. Analysis of the fundamentals of rocket propulsion shows (a) that its characteristics are (i) an enormous rate of power generation, (ii) independence of external media, e.g., fuel, support and thrust, and (iii) absence of recoil (surely the movement of the rocket itself is the recoil); it shows (b) that performance depends upon jet velocity, which in theory can be as much as 12,000 miles per hour; and it also shows (c) that there are two ways of using a rocket motor, (i) to impart continuous but very brief drive, or (ii) to

impart enormous initial velocity which will be maintained in an almost perfect vacuum (A.4 and V.2 do this), hence the advantage of launching sites on the tops of high mountains. With these latter, the range depends upon the velocity after the fuel is burnt out, and the use of wings to produce and prolong the glide will give enormous ranges. A.9 was to have a trajectory of 800 miles, to begin to glide at 8,000 m.p.h. and to have a total range of 3,000 miles. It appears that 14,000 m.p.h. (=4 miles per second) would be a sufficient initial gliding speed for all terrestrial ranges; and this could easily be attained by "step-rockets" launched from high altitudes.

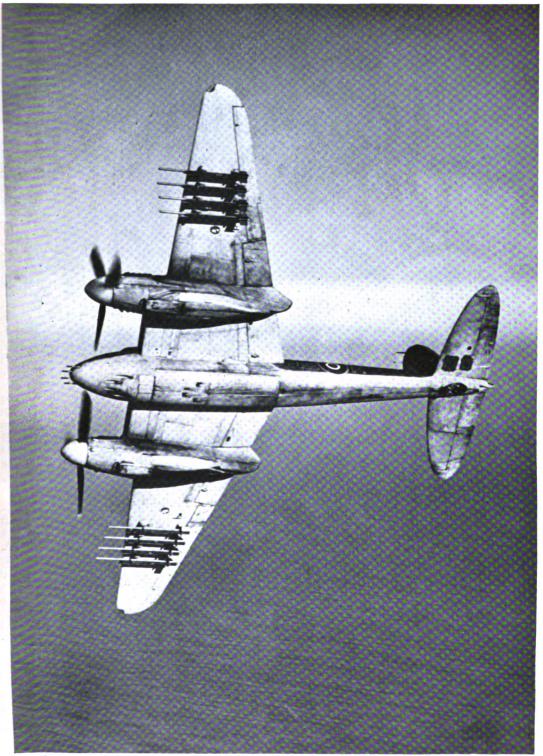
Short range rocket-projectiles are already represented by the Katushka and Bazooka. With these "a few infantrymen can now destroy the largest tank," and "rocket mines are also effective anti-tank weapons." Airborne rockets have manifest advantages over airborne guns, not the least being that the gun's weight is considerable and has to be carried after all the ammunition has been expended. It is said that the fire power of a rocket-carrying Mosquito is equivalent to that of a six-inch gun cruiser, and that it could prevent all movement of armoured fighting vehicles within its range. The possibility of air-to-air rockets. aimed by radar, detonated by "proximity," and even guided from an aircraft or from the ground must be seriously considered; while for weight-carrying aircraft a rocket-assisted takeoff would increase the possible load.

Medium range rocket-projectiles may be of two kinds, "piloted" and "guided." Those with pilots must have a very short endurance -not more than five minutes at full power. Me.163 attained 40,000 feet in three minutes. and the Natter reached the same height in a little over one minute. These may supersede the interceptor fighter, and the result will be that long-range bombers will be superseded by long-range rockets. Here the human pilot disappears. "The human body can withstand only limited accelerations, can respond to only a few stimuli at a time, and has comparatively slow reactions . . . "; and " there comes at last a time when only machines can fight machines." Guided rocket-projectiles include the Wasserfall, Schmetterling and Rheintochter. They are controlled by radio from the ground and directed into the bomber stream, where they "home" on to their targets by radar or infrared detectors. They are capable of the speed of sound, and there could be no defence of bomber formations against them. They mark the end of the man-carrying fighter aircraft but not the end of the fighter-pilot, whose function in the future will be to direct these cunning emissaries by remote control from aircraft or ground. Guided rocket-projectiles will obviate the need for large and vulnerable aircraft carriers; they could replace heavy guns on capital ships, and they are the only conceivable defence against long-range rocket bombs.

Long-range rocket-projectiles have so far been represented in concrete form by A.4, whose speed was 3,400 m.p.h. and range 220 miles. By the addition of wings, it was to become A.9 with a range of 3,000 miles, when used as a step-rocket and launched from A.10, a "booster" rocket weighing 85 tons. Against such a missile there is no present defence. Long-range rockets are very economical in cost, production and man-power, and their launching sites need not be vulnerable. Consider these figures: a 100-ton rocket carrying 70 tons of fuel could travel 3,000 miles carrying a payload of one ton (=2,240 lb.) of explosive. "As atomic bombs weigh only a few hundred pounds and can never be much larger, it seems impossible to make any convincing case for the very heavy bomber." Inaccuracies can be overcome. "The rocket is the ideal means of delivering atomic explosives, and it may soon prove to be the only method that can be used without the destruction of the attacker." And here are some stupendons thoughts! Atomically propelled rockets could reach the speed of light. This would be impossible in atmosphere; but very high speeds on constantly "randomed" paths would make interception impossible.

Infinite range rocket-projectiles open up a fascinating field for thought. "A rocket which attains a speed of five miles per second outside the atmosphere would never return to earth, but would continue to circle it for ever in an astronomical orbit. . . . At seven miles per second it would escape from the earth's gravitational field and recede into space." This is impracticable with chemical fuels, but with atomic energy it is quite practicable and may well be the immediate outcome of any harnessing of atomic power to rocket propulsion. "The least of the achievements we may expect to see is the establishment of stations in closed orbits at heights of 1,000 miles or more, circling the world in periods of a few hours like artificial moons—an attractive solution to the problem of world surveillance and control."

The subject of atomic energy and atomic bombs is obviously inseparable from that of rockets and rocket-propelled projectiles, and this introduces us to a new type of warfare:



MOSQUITO R.P.

[Photo: Charles E. Brown

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MOSQUITO XVI

[Photo: Charles E. Brown



METEOR IV

[Photo: Charles E. Brown



HALIFAX

Photo: Charles E. Brown



LINCOLN



Radiation Warfare. An atomic bomb acts as an X-ray generator of unimaginable power, and the effects of this radiation may be far greater than that of the pressures set up by the explosion. By radiation alone vast areas could be interdicted, crops blasted and all agricultural processes stopped. One rocket-bomb every few hours would be sufficient to effect this. And there could be no defence! Total war is bounded only by the limits of man's material powers and these are rapidly receding towards infinity. What then of future wars? Do these possibilities render navies, armies and manned air fleets obsolete? By no means. Navies will still be needed for transport overseas, but they will probably consist solely of submersible craft, including mobile rocket launchers. Armies will still be needed for occupation and control, being probably kept in reserve until the issue has been decided by long-range atomic rockets; but land forces may still be required to fight in special circumstances, e.g., jungle warfare. In the air there will be small high-speed forces for precision bombing, but no more heavy bombers. There will have to be transport aircraft for troops and equipment, but fighters will be superseded by guided rockets and remote controlled pilotless aircraft with W/T and television. And, of course, there will be aerial combat between squadrons of remotely controlled p.a.c.'s and between automatic p.a.c.'s and between some of each.

The problem of defence grows ever more important and more difficult. Between the introduction of a new weapon and its countering, the damage done grows rapidly greater. The rocket is singularly convenient for treacherous, unheralded and perhaps overwhelming attack. Offence has now so far outstripped defence that "civilization may soon have the means to commit suicide at will." And "the problem is not one of defence but of survival." Even the deepest underground shelters would be useless, except perhaps those in the hearts of large mountains. The British Empire, on account of its dispersal, is the least vulnerable of all nation groups, but the British Isles are untenable. Hence it will be necessary to remove the control centre of any future imperial war effort, and the Service departments, from London to Canada. Even there they would be within hostile range, but safer than in Britain. We have now come to this: A country's armed forces, however strong and well organized, can no longer defend it: the most they can promise is the destruction of the attacker. "The only defence against the weapons of the future is to prevent them ever being used"; so the problem is a political one and not a military one. The solution, of course, is some form of world organization such as the United Nations, or later perhaps a unitary World State. Meanwhile how can rockets be used as instruments of world security under U.N.O.? It is suggested that twenty launching sites with interlocking circles of fire, staffed by men with a supra-national outlook and well ahead of all nations in research and scientific development, should be sufficient to give the world coverage—and peace. It might be an uneasy peace, but until the World State is formed, around these supra-national scientist-monitors as a nucleus, such threatened sanctions would be necessary and effective. Only when the World State is formed could these sites be dismantled -and then they should be dispensed with altogether.

That, it appears, is the last hope—the only hope. For to quote again from the winner of the prize for the best essay in all three subjects (whom we have freely quoted already)—these possibilities "point a lesson which the human race must learn now, for there may be no second chance. It will be a little late when the dust of all man's treasures incarnadines the sunsets of the world." And again, "If we fail in our generation, those who come after us may be too few to rebuild the world when the dust of the cities has descended and the radiation of the rocks has died away."

A few considerations that have not been

fitted into the foregoing summary:

1. Against the British people rocket projectiles were a failure, and the failure was due to a moral and not to a material defence. The people knew they could do nothing about it, so they shrugged their shoulders, took their chance and did not bother.

- 2. The new inventions will be powerful ancillaries to the main war machine, but they will probably not become the main war machine itself.
- 3. Pilotless aircraft are not subject to drop in morale as a result of high casualties, but they cannot dodge gunfire, though variable courses may be set.
- 4. The future defence of London will be simple and can be expressed in one word—EVACUATE!
- 5. Future armies will only be able to advance in the rear of a rolling belt of devastation sixty miles' deep, and a manned bomber force will be essential to produce this devastation by atomic bomb.
- 6. Only manned aircraft can discriminate between targets. Hence U.N.O. should not use

rocket bombs or pilotless aircraft.

7. Defence against rockets may be the same as that used against flying bombs—accurate location and tracking of the missile (by radar), accurate prediction of its course, accurate firing of the guns, and accurate detonation of the shells by magnetism responding to the presence of the rocket itself in the magnetic field of the shell. These elements combined were generally successful in defeating the flying bomb; but to defeat a rocket bomb, a further element will have to be added—extreme speed of operation. Location, prediction, firing and the velocity of the shell itself will have to be speeded up enormously to cope with the very much greater speed of the rocket.

8. Despite claims to the contrary, the longrange rocket cannot be stopped any more successfully than can an artillery shell be arrested in flight or a bomb countered once it has been

released from the attacking aircraft.

9. Short-range rocket projectiles may be

used as "terror weapons" over short ranges and so replace modern artillery and medium bombers.

10. Jet-propelled high-speed interceptor fighters can be quickly and cheaply produced. So an impoverished nation could rapidly build up a defensive air force capable of causing considerable embarrassment to fleets of conventional bombers.

11. Any nation is liable to utter defeat if it endeavours to conduct a war with tactics employed or weapons found effective in a preceding war. The age of rocket power is now commencing, and with rocket power the long-range missile becomes the most important method of waging war. It will be necessary, therefore, for atomic power plants to be available in order that a nation may be fully mobilized at all times for defence. A sufficient number of directed missiles must always be ready for retaliation against any aggressor and atomic power will be necessary for their effective use.

2nd Prize Essay—Subject No. 1

By Flying Officer W. S. Dundas

THE Charter of the United Nations, signed on 26th June, 1945, at San Francisco, by the representatives of fifty nations, is the machinery installed for promoting the future peace and prosperity of the whole world. The attainment of so ambitious a goal essentially requires the examination and improvement of a vast pattern wherein Security, Economics, International Justice, World Employment, Trusteeship of Non-Self-Governing Territories, Standards of Living, and Educational and Social Progress are all inextricably interwoven.

Out of all these seemingly diverse sections of the Charter it is the part to be played by the Security Council that is of the most absorbing interest to the average citizen of any country; for without "Freedom from Fear," that is, freedom from the uncertainty of any future outbreak of world war, it is impossible for political, economic and cultural progress to be made with any degree of confidence and hope of lasting achievement. It is in the ability of the Security Council to enforce international law and order that the ordinary citizen will seek grounds for his belief in the efficacy of the United Nations Organization. Lacking this power (i.e., adequate military forces immediately available to the Security Council) to enforce its decisions, the United Nations Organization will be in as pitifully incongruous a position as was its predecessor, the League of Nations.

As we are concerned here solely with the possible commitments of the Royal Air Force and its relationship to the Security Council, we will pass over those provisions dealing with other "armed forces, assistance and facilities," and examine Article 45 of the Charter. This states that, "In order to enable the United Nations to take urgent military measures, members shall hold immediately available national air-force contingents for combined international enforcement action. The strength and degree of readiness of these contingents and plans for their combined action shall be determined . . . by the Security Council with the assurance of the Military Staff Committee."

The foregoing article appears at first sight to embody all necessary preparation for an emergency, but there are two points concerning these "national air-force contingents" which merit serious consideration.

They may be categorized briefly as "Delay" and "Lack of Cohesion."

Delay is probable because the fifty signatories to the Charter, although agreeing to provide a certain "strength and degree of readiness," must have their agreements ratified by their respective "constitutional processes." In effect these quotas of air-force contingents must first be decided on by the Security Council (as advised by the Military Staff Committee), agreed to by the representatives of the various states, and will, after a

period of time, presumably be ratified. The state concerned will then assign the necessary proportion of its air force to be at the disposal of the Security Council at a fixed degree of readiness. It is obvious therefore that no small amount of time—varying according to the peculiarities of their "constitutional processes" and the state of their national air force—will have elapsed before all these contingents are at operational readiness.

But whereas the time taken to attain operational readiness is unimportant in the event of the air force of the state in question not being called upon for some years, lack of cohesion is a formidable obstacle which the passage of time cannot surmount.

There is a story told of Richard Cœur de Lion that when in parley with Saladin prior to giving battle he said, intending to illustrate the unity of the Christian cause, "We are many kings—but with one army." To this Saladin confidently replied, "I have many armies—but they have only one king! "It can be assumed that the experienced Saladin realized full well that the difficulties of commanding a force of mixed nationalities far exceeded those of his own command, where identical language, race and creed prevailed.

The Royal Air Force, with which are integrated the Commonwealth and Empire Air Forces, and numerous Allied air units, has provided an outstanding example of how a heterogeneous polyglot society can be welded into one efficient unit, wherein the quality of esprit de corps is present in full measure.

Not only were separate Allied units, organized, trained and operated as they were on an identical basis, able to carry out their entire duties far more successfully than can possibly have been originally envisaged, but individuals of all Allied nationalities served singly in long-formed regular R.A.F. squadrons and were happy alike in their operational duties and the social side of their life. Indeed some of the "happiest" squadrons and those in which the indefinable spirit of camaraderie was most marked were those squadrons in which a large number of Dominion and Allied nationals were represented. Whatever the reason, it has seemed easier for unity among diverse nationals to be obtained through the freemasonry of the air than in the other Services, and although this cohesion was successfully achieved in the Eighth Army from Alamein onwards, it has never been so strikingly demonstrated as in the Royal Air Force.

It would be a wanton waste of high achievement were this spirit of international unity in the Service dissipated by the advent of VJ Day, or if the organizational experience gained during the past five years could not be utilized in the formation of a true International Air Force.

Returning to the provisions of Article 45, it would seem that if a state had earmarked a proportion of its air force to be at the disposal of the Security Council, such personnel will remain complete strangers to all other Allies until called upon to serve side by side in an operational capacity. Speaking their own tongue, disciplined and administered according to their own military customs, and serving in their native country only, they will lack the characteristics that distinguished their predecessors in this war, and all the difficulties that beset the Allies five years ago will once more be encountered if an emergency should arise. The permanent establishment of numerous liaison officers from other Powers and frequent visits from their high-ranking staff officers would not remove such difficulties.

There is only one way in which an unquestionably *International* Air Force could be formed on whose loyalty, efficiency and immediate readiness the Security Council could unhesitatingly rely.

To create this International Air Force it would first be necessary to set the highest possible standard for its personnel, and to let it be universally accepted as one of the most honourable and "exclusive" careers. The pay, amenities and social standing would be appropriately high and each country would select from volunteers its "contingent." If the advantages and honour appertaining to this career were made sufficiently great, there would be no lack of volunteers, and those selected to represent their country would be the cream of that country's young manhood.

The selected contingent would then be "posted" direct to an International Air Force Training Wing situated in a climate suitable for all-the-year-round training, such as Australia, Canada or South Africa.

Here the contingents of fifty nations would be mustered into appropriate branches and trades, receive equal pay, training with the best modern equipment and under the finest instructors, live on equal terms in the same messes, and become imbued with a sense of esprit de corps, loyalty to U.N.O., and pride in their calling. On completion of their training they would serve at United Nations' airfields located in any part of the world which strategic importance might justify. During their overseas service the quality of patriotism would be sublimated and its potential energy directed to embracing the ideals of the United Nations Charter. It would be a Service in the best sense of the word, but instead of swearing allegiance to "King and Country" or their respective equivalents, the allegiance of all personnel would be pledged to the authority for

maintaining world order. Each member of this "Corps d'élite" would be oblivious of national interests and, in conjunction with the regulations which govern the Secretary-General and his staff, would not "seek or receive instructions from any government or from any other authority external to the Organization." National pride, as typified by the Wehrmacht, would be replaced by pride in world service—the pride of those who have dedicated their lives to the protection of humanity from the horrors of another world war.

The training would of necessity be longer and more thorough than that enforced by the haste and exigencies of war time; not solely with the object of producing a more efficiently trained pilot or tradesman, but because, lacking the urgent incentive of a common enemy, more time would be required for the merging of all nationalistics into accommon the thereing

alities into a common brotherhood.

The so-called "friendly rivalry" existing in the atmosphere of international games has never been any more successful than "exchange of youth" visits and other similar projects for fostering the "brotherhood of man." Such attempts have more often been productive of antagonism rather than friendship, and there are few cases where an unqualified success could be claimed.

To a world already scrabbling and grasping in commercial spheres the well-meant efforts of various bodies to promote peace and friendship between nations are of too small a scope to have any influence of practical value, and it is only a life lived in a service common to all that can provide the key to true fraternity.

If the training—particularly as regards standards of integrity and sublimation of nationality—can be carried out as successfully as that of our Allies in the R.A.F. during the war, and their respective national forces are not permitted to influence their ideas or ideals, there need be little fear of failure in the creating of this superb body

—" chevaliers of the air."

Obviously modern warfare, now that it is waged with a callous disregard of Hague Conventions and bereft of all principles of human decency, can be suppressed only by methods similar to those used by the police to prevent outbreaks of crime. In other words, a carefully planned treacherous attack without a formal declaration of war, as exemplified by Pearl Harbour, would be a possible coup unless the Security Council has available forces which can go

into action immediately. Blitzkrieg allows no time for the attacked to inaugurate diplomatic discussions with possible allies or to thresh out the finer points of a mutually advantageous grand strategy.

Consequently, until this International Air Force is strong enough to take over its entire responsibilities, some adequate force will be necessary during the period of I.A.F. training.

Here is where the R.A.F. can make its unique

contribution.

Unlike the American and the Russian Air Forces, which are simply a "corps" of their armies, the R.A.F. has, since 1918, been a separate entity. Accustomed as it is to the formulation of an independent air policy which is influenced by, rather than a sub-division of, military policy, it would be appropriate for the R.A.F. to be the foundation-stone of the "temporary" world air force. The U.S.A. and U.S.S.R. would naturally be expected to add their contributions, but as the R.A.F. and U.S.A.A.F. have worked in harness together long enough to require few administrative adjustments, and their composition and combination alone would give a fairly worldwide representation, their integration should be a comparatively simple task.

The particular reaction of the Kremlin to this scheme is naturally difficult to forecast, but should the recent tendency of Russian foreign policy be maintained at its present tortuous level the R.A.F. and U.S.A.A.F. could at least stand by until required to abdicate in favour of a more

leisurely drawn-up scheme.

If the execution, or at least the consideration, of these schemes were promulgated immediately and given the widest publicity, interest in the new I.A.F. could be awakened among the peoples of each country.

A temporary air force would at once be at the immediate disposal of the Security Council while a superb force of true international character was being built up to take its permanent place in the

service of U.N.O.

Only in the "Service atmosphere"—free alike from pecuniary profit and commercial and political strife—can the first steps towards world amity be made. From the example which could be set by this new International Air Force, where Pole and Russian, Dane and Frenchman, Serb and Rumanian, etc., would eat, drink, work and play in perfect harmony, we may yet see the first grey streaks of the dawn of the World Commonwealth.

2nd Prize Essay—Subject No. 2

The Employment of Air Forces in Imperial Defence and Combined International Enforcement Action

By Wing Commander J. H. Lapsley, O.B.E., D.F.C.

THE British Empire has just succeeded in fighting its way to victory through six years of bitter total war, and now we are faced with the problem of shaping our defence forces for peace. In the war just finished, man power has throughout been our greatest limiting factor; in the present peace every available man must be in productive employment if we are to regain our essential export trade and better our conditions of living. For this reason as well as from financial necessity the Armed Forces must be cast in the most economical and efficient form possible.

The British Empire presents enormous problems of defence. It occupies 13.4 million of the world's total land surface of 54 million square miles, yet only from the Cape of Good Hope to the Sudan is there any continuity of territory. Two-thirds of the total area and four-fifths of the population lie around the Indian Ocean. Eighty thousand miles of essential sea routes separate the Empire's important parts and there are 20.000 miles of land frontiers with foreign countries. The Empire's sea communications, its land and air frontiers, its interests in foreign lands must all be defended. Internal security must be maintained within the Empire, and finally our forces must be capable of fulfilling the obligations undertaken by the Empire in the United Nations Charter.

It is impossible for our country or our Empire to maintain forces of sufficient strength in all our territories at one time to meet each of these commitments. Reinforcement must therefore be the policy, and rapid reinforcement can be attained only by high mobility. This has indeed always been the policy and concept of the defence of the Empire. Before the 1914-18 war this mobility of force was achieved entirely through the Royal Navy. Between the wars it began to be realized what great advantage could be attained from the inherent mobility of aircraft in policing large territories. Now, with our air forces tried and mature, with their striking power increased overwhelmingly, with knowledge of the air's true possibilities and limitations, it must be determined how air power can best be used to provide economy of effort, in the defence of the Empire,

and in meeting our treaty obligations in accordance with the United Nations Charter.

Aircraft are inherently mobile. That is, an aircraft can strike the enemy at any point within its radius of action. The old barriers of land warfare, mountain ranges, swamps and rivers, and their counterparts such as shallows, minefields and boom defences in war at sea, are set at naught by the aircraft's mobility. This fact alone enabled our country to strike at the heart of Germany during the years between Dunkirk and the invasion of Normandy. Unfortunately, however, air bases are extremely immobile, and longrange aircraft flying from distant bases cannot efficiently give the tactical support and air cover required by the ground forces.

The R.A.F. formed three mobile tactical air forces during the war, in the Middle East, Europe and Burma. These forces indeed achieved a comparatively high degree of mobility with fighter-bombers, after months of trial and error. The problems of moving a strategic force of heavy bombers from Great Britain to the Far East were even greater. The bases, communication, and navigational aids had all to be on a far more lavish scale for large aircraft, and the end of the war saw this problem only partly solved. With our world-wide commitments, both within the Empire and under the United Nations Charter, the problems of making all our air forces, both tactical and strategic, fully mobile, to meet a threat wherever it may occur, must be solved.

The outstanding characteristic of the British Empire is its maritime nature. It is so dispersed and disposed that the sea is the natural highway for its communications, and, despite the growing capacity of cargo-carrying aircraft, ships will probably continue as its best and most economical method of heavy transportation. Thus a considerable part of the Navy's work in peace time consists of routine patrols for the prevention of smuggling and poaching, and the general maintenance of law and order on the high seas. An aircraft with its wide field of vision, high speed and long range, can cover great areas of sea in much less time than a ship. The use of reconnaissance aircraft, to direct surface craft towards

any suspicious activity, can therefore greatly cut down the number of ships employed on routine patrols and save many thousands of miles of routine steaming each year.

In war the Navy is charged to defend our sea communications from attack by a great naval power. Now, however, it is not only a naval power which can attack these routes, as a great hostile air power might cut them even more effectively. During the war aircraft gradually perfected the technique of attack on shipping, until the sinking of battleships was accomplished with comparative ease by small forces of aircraft. It appears probable that the atom bomb, though possibly not in its present form, will be completely successful as an anti-shipping weapon, and the threat of this weapon to our convoys at sea will probably result in great changes in naval tactics. The added danger of the complete devastation of our harbours, which in itself could cut our communications, is a problem which must be faced by our air defence organization backed by the Empire's best scientific brains. Failure successfully to counter such attacks might well entail the loss of the United Kingdom as a base. It would be rash at this stage in the development of atomic weapons to presume this as a probability, or that in future wars no ships will be able to sail the seas. One fact, however, emerges with great clarity, and that is the need for a large force of aircraft carriers in the Navy.

The battleship, in its present form, as the basic unit of a fleet, is now obsolescent. Even without using the atom bomb, aircraft have reached the stage in development when they can strike a battleship so powerfully that, even if it is not actually sunk, it is an easy prey for light fleet craft. No fleet or convoy, therefore, can live in the face of determined air attack without air cover. Yet fleets and convoys must inevitably go where shore-based aircraft cannot cover them. It is immaterial that ranges of aircraft will increase, as far better and more economic cover by fighters with better performance can be obtained from aircraft operating from carriers than by long-range shore-based fighters. Moreover, a strike at an enemy fleet by carrier-borne aircraft over a range of probably not more than 200 miles is more likely to be successful than one by aircraft flying possibly 1,000 miles from land

Although strategic bombing can be carried out from great distances, it is essential that a tactical air force working with land or sea forces is based as closely as possible to the battle. For combined amphibious operations involving a long sea crossing, which would certainly be necessary if Great Britain were lost as a base, the aircraft

carrier offers the only base available for the tactical air support and cover for the Army's assault until shore bases are captured.

It might be argued that the enemy would always be able to bring a greater concentration of land-based aircraft against the carrier force than the carrier's aircraft could counter. This, however, has not proved to be the case, as owing to the extreme mobility of a carrier-borne air force the element of surprise in attack can be exploited to the full, and it is impossible for the enemy to dispose strong enough forces at all vulnerable points to beat off strong attacks. As soon as shore bases are available in sufficient quantity to take the necessary tactical air component, the carrier's task is done, and, being vulnerable itself to air attack, it must be withdrawn as soon as possible. These tactics proved extremely successful in recapturing the islands which acted as stepping-stones for the strategical air bombardment and preparation for the invasion of Japan. From this it follows that that part of the R.A.F. designed and trained for tactical support must have sufficient training in aircraft-carrier technique to be able at least to fly off carriers when the shore bases are available, and, ideally, to be able to work from carriers in the assault.

There are no factors at present to preclude the use of our very best fighter and fighter-bomber aircraft from fleet carriers. Rather it seems that, with assisted take-off by the use of accelerators or rockets, and with improved arrestor technique for landing, it is possible that the carrier will provide a better base than the landing strips, which can be hastily constructed during tactical support operations. In this form, therefore, a powerful air force can be made available to act either in conjunction with the Navy or Army, or on its own, in any part of the world without previously prepared bases. The advantages of this either in a major war or in quelling a minor disturbance are very great.

The tasks of the Royal Air Force in war fall broadly into four categories. There is the strategic bombing of the enemy's war industry, which includes his transportation systems, the defence of our own war industry and transportation systems from air attack, and the provision of cover, reconnaissance and offensive air action in support of our ground forces, so that they may more easily accomplish their task. Finally, there is a commitment which is growing daily for air transportation of the men and material required by all three Services.

Strategic bombing is the true air force offensive. The effect on industry of this form of attack by a modern heavy-bomber force is tremendous. It is admitted by the German General Staff that

the strategic bombing by Bomber Command and the 8th American Air Force was the greatest single factor in Germany's defeat. In future, employing atomic bombs, strategic bombing may well be decisive. This form of attack can be carried out over great and increasing ranges; it must be remembered, however, that the efficiency of these attacks falls off as the distance to the target increases.

This is due to a variety of reasons. Over greater ranges the number of sorties possible by each aircraft will be fewer; navigational aids relying on transmissions from friendly territory become less accurate, while dangers from interception by enemy fighters are increased. Also at present day and night attacks necessitate the use of different formations and tactics, and there is therefore a definite limit on the distance that can be flown safely under cover of darkness or in daylight by a night- or day-bomber force. Thus, in spite of the probable increase in the range of heavy bombers, in order to operate a force efficiently it will be necessary to have adequate bases on which the whole of our bomber strength could be concentrated within about 2,000 miles of the

The areas chosen for these bases should be on a large land mass where a supply and repair organization, ideally self-sufficient, can be maintained. In choosing the locations of these main bases it is reasonable to assume that the British Empire will never wage war against the U.S.A. and that no large-scale operations will ever be necessary in South America. With a range of 2,000 miles and operating from bases in Great Britain, the Middle East and India, all the industrial areas of the European and Asiatic land masses except Japan can be covered. This gives a very wide field of useful employment.

In order to bomb Japan from bases in India or Australia, a heavy-bomber force with a striking range of 4,000 miles is required. This would be an uneconomical force to maintain and operate, but this range would also be necessary to operate from Canada against the mainland of Europe if the United Kingdom should be lost as a base. Research and development in this matter are therefore undoubtedly necessary. In view of the tremendously destructive power of atomic bombs it is possible that the main bomber force could have its range increased sufficiently by fitting extra petrol tanks while still carrying a useful bomb load.

For economic reasons these bases cannot be permanently fully manned, so it will be necessary to build up a system of rapid reinforcement. To this end, aircraft adopted by the Service should be capable of operating with only minor modifi-

cations in any climate. The additional units needed in certain of the base areas with less developed civil facilities for maintenance, signals, hospitals, etc., must be carefully estimated in advance. Additions to existing establishments to fit local conditions must be known, and the personnel to man these units must be earmarked and trained. The crating of equipment and stores should be standardized, and loading tables, listing the exact amount of shipping and/or air transportation space needed to move each unit, prepared. Moreover, the exact supply requirements of such a force must be calculated and the sources of supply and the transportation entailed fitted together. This "logistic support," as it is termed by the Americans, is all-important to the force's operation efficiency. Finally, such moves must be practised until they can be accomplished smoothly and efficiently.

If our bomber force were organized on these lines it would ensure that our maximum heavy-bomber effort could be concentrated in a very short space of time to counter a threat, wherever it developed. The mere presence of such a force might well deter an aggressive nation from war. Moreover, it would be a very economical organization, as less squadrons need be maintained if the whole effort can be quickly concentrated at one place. With this rapid mobility the main bomber force could be normally based in the United Kingdom, which in itself would save a great deal in transportation and maintenance costs, and would be advantageous for training.

For the security of the Empire it is essential that our vital bases and other strategic points should be guarded by adequate air defences. The United Kingdom is the most important of these bases and the air defence of the United Kingdom must have the highest priority of all the R.A.F. commitments. No effort or expense can be too much to ensure its efficiency. The bases chosen by the Navy, in the light of the development of modern aircraft, and the industrial areas, ports and cities of the Dominions and Colonies must also have highly developed air-defence systems.

Here again rapid reinforcement is the key to economy. The points mentioned previously in connection with facilitating the rapid movement of the ground forces and equipment of the squadrons of the strategic bomber force apply equally to the fighter defence squadrons. There is unfortunately an additional difficulty in the movement of the aircraft owing to their comparatively short range. This can be solved either by increasing the range to a maximum by the use of additional fuel tanks for ferrying flights and maintaining air routes with refuelling points between the main bases, or by the use of aircraft

carriers to transport the aircraft over the greater part of the distance. Both these solutions have been extensively used in the last war, and it will be necessary to continue with both methods, as each has its advantages in different circumstances.

The Army is still the ultimate arm of the Fighting Forces. Its task in war is to oppose the enemy land forces. Helped by the other Services, its aim is to defeat the opposing land forces and enter the enemy's territory, where it can then impose its will on the enemy civil population. This is necessary in either a small tribal rising or a major national war.

The British Regular Army is necessarily maintained with great economy during years of peace, yet its commitments are great and world-wide. The Dominions maintain their own armies for local defence only, and special legislation is necessary in each Dominion before their forces can be made available as a whole for Imperial purposes. Thus the main burden of providing garrisons at naval bases, defended ports and harbours of Imperial importance abroad, and the maintenance of internal security in India, the Sudan, Palestine, Cyprus and other British colonies and mandates, rests on the British Regular Army.

Between 1919 and 1938 the Army was maintained at a strength of about 199,000 men, of whom about 110,000 were at home, 30,000 in colonial stations and 59,000 in India. When it is realized that these forces, with the assistance of local troops, must bear the brunt of external attack anywhere in the world until reinforcements are available, the comparison of its size with its responsibilities shows it to be unique. If national service is accepted in Great Britain more ground troops will be available than previously, but there is no doubt that the Army's burden can be greatly eased and its efficiency increased by the employment of air forces.

Provided that air forces can operate rapidly in a threatened area, a smaller ground force can hold an external attack more easily until reinforcements arrive. Moreover, by the employment of a highly developed air transport system troops can be very rapidly concentrated in a threatened area, which again permits local garrisons to be reduced. Both these factors give an important additional advantage to the Army in that forces can be concentrated at a few strategic points with a resulting improvement in training and economy of supply.

After the commencement of hostilities on either a large or a small scale, airborne forces can be given the extreme mobility which, with its

resultant surprise, enables an enormous effect to be made by a comparatively small force. Given air superiority, troops cut off by enemy forces can now be supplied almost indefinitely by air, their casualties evacuated and their reinforcements flown in. Moreover, the resulting feeling of contact with the main force has a very real moral value to the troops.

To help the Army in this manner necessitates the maintenance of an efficient air transport force. The value and importance of such a force have been conclusively proved in the last war, and its responsibilities and uses to all three Services will undoubtedly increase. This force should be responsible for the maintenance of our reinforcement air routes throughout the Empire. At present its size is difficult to determine, but it should be capable of moving sufficient personnel for at least 30 per cent. of the strategic bomber force to become immediately operational from any of its bases, and of lifting the Army's maximum requirements of immediate reinforcements.

The value of direct air cover and support to an army is now generally realized. Its action in both defence and attack makes a tremendous saving in the man power required, for any given task, and no major offensive can be successful unless the air battle has already been won.

Also aircraft can assist the ground forces in routine patrolling in the same way as they can help the Navy at sea. In desert areas particularly an aircraft can spot movements from a considerable distance and direct ground forces straight to their objective. This both reduces the number of patrols which need to be maintained and saves the ground forces much unnecessary and uncomfortable patrolling. It is necessary, therefore, to ensure that air support will always be immediately available to the ground forces wherever they may require to operate. To effect this, the air defence systems of the main bases in the United Kingdom, Middle East and India should include a Tactical Air Force component of fighter and fighter-bomber squadrons, ready to move into the field with the Army whenever they are required, but held normally to increase the defences of the vital bases.

During the war tactical air forces attained a high standard of mobility, and this standard should be improved during the peace-time training. For these forces it is important that both aircraft and vehicles are satisfactory under the worst conditions of maintenance and usage. Here, too, the necessary data for the "logistic support" of the force must be carefully prepared, and the loading tables and transportation requirements known exactly. Finally, these units must be practised in mobility and in operating under

field conditions, with all their ensuing complication of signals, maintenance and supply.

It is now possible to summarize the role air forces can take in Imperial Defence and combined international enforcement action and the effect that their employment may have on the existing responsibilities of the three Services. At sea, and in defence of our sea communications, both in peace and in war, carrier-borne aircraft can be the basis of fleet tactics and strategy. Air reconnaissance can cut down the number of ships needed for routine patrolling, and save thousands of miles of unnecessary steaming. By building up forces of carrier-borne aircraft, air forces can be operated in any part of the world without previously prepared bases. They can thus provide the fleet with air protection and a powerful striking arm when out of economical range of shore-based fighters and strike aircraft. Many times in history the mere presence of a British man-o'-war has been a sufficient threat to nip troubles in the bud; the threat of either a land- or carrier-based air force will have even wider effect. In a major war and with the probable development of atomic bombs, strong air forces, both land- and carrierbased for economy of effort, will be essential for the maintenance of our sea communications upon which the safety of our country and the Empire will continue to depend.

In land warfare, as at sea, the employment of air forces produces a great saving in man power. Large areas of difficult country can be policed with ease by very few aircraft, and the ground forces can be directed easily to a threatened area instead of being widely deployed on reconnaissance. In a major war air superiority, with its ensuing immunity from attack of our ground

forces and its powerful striking power against the enemy's forces and supplies and crippling effect on his transport, is now vital to the maintenance and success of the land battle. To provide this air power, tactical air forces capable of operating in the field in the closest co-operation with the ground forces must be specially equipped and trained.

To meet the threat of the enormous destructive potential of atomic weapons, the air defences of our base areas, and especially of our main base in Great Britain, must be brought up to the highest possible state of efficiency. The necessity of making our bases secure from air attack cannot be over-emphasized, and our organization must permit of rapid reinforcements in a threatened area.

Finally, the great hitting power of our own bomber forces must be maintained and the bases built so that the attacks can be delivered on any country in the world that menaces our safety, or against whom the United Nations decide on joint enforcement action. This strategic bombing is the true air power. In the last war its effect was the greatest single factor in the winning of the war; its crippling effect on the enemy's transportation and production was felt on all fronts. In the age of atomic weapons its effect will be much greater and may well be decisive.

Hostile air power, then, with its dominating influence on sea and land warfare and its great destructive power against the industry and ability to fight of a nation, is the greatest threat to our safety; while air forces which give air power, with their great mobility, flexibility and speed, are the ideal forces for the defence of the widespread territories and life-lines of the Empire.

2nd Prize Essay—Subject No. 3

The Effects of Directed Missiles

BY CORPORAL E. BURGESS, R.A.F.

HEN the first Vergeltungswaffe Zwei rose from its launching base, to crash a few minutes later on to the City of London over two hundred miles away, all weapons then in existence became as obsolete as did bows and arrows with the invention of the firearm. The German nation had placed before humanity a weapon which showed plainly that world cooperation and the peaceful settlement of disputes were essential for the future survival of civilization. It must not be imagined for one moment, however, that V2 was anything more than the forerunner of rocket-propelled and remotely con-

trolled missiles which would be capable of performing innumerable tasks both in peace and in war.

Included in this class of robot missiles must be the Vergeltungswaffe Eins, or pilotless aircraft, which was popularly known as the V1 flying bomb. It is not likely that missiles of this pilotless aircraft type will find extensive application in future conflicts, other than as possible replacements for present-day artillery. Indeed, modern equipment as used during the final stages of the recent conflict makes it possible for such directed missiles to be relatively easily detected and des-

troyed. They do not travel at very high velocities, so that even aircraft can be used to shoot them down. Suitable placing of the defensive screens and patrols can effectively prevent any of the missiles from reaching the target area. The surprise use by the Germans of this weapon in June, 1944, did not produce the anticipated results. Within a few months the British defences destroyed the majority of the missiles which were launched against London. Towards the end of the attack, just before the launching sites were overrun by the Allied troops, the use of the flying bomb was almost a waste of time. From the military standpoint it was nothing more than a mere nuisance, since the deployment of sufficient defensive forces against it could ensure that the weapon failed to reach its objective. How much more so must this be in the future, when all nations will be, or should be, prepared against this form of attack!

The idea may, nevertheless, be applied to create a terror weapon for use over short ranges, thus replacing modern artillery and medium bombers. Doubtless it will also be used effectively against cities of those small countries which may not have sufficient scientific and industrial resources to create and maintain suitable defensive equipment. Small nations with isolationist tendencies are thus liable to be overcome even more quickly than they were by the blitzkrieg tactics of the Wehrmacht.

It is the peace-loving nations who are forced to economize in the matter of war machines, solely because their way of life demands that the application of labour and material should be to the improvement of the conditions of human existence. Cost and efficiency of lethal weapons must, however, never be considered as a deterrent to their manufacture, but of interest is some knowledge of the productive effort required for the manufacture of the pilotless aircraft type of missile. Captured German industrialists stated that each V1 needed the expenditure of 1,000 man-hours in its construction. The aircraft was capable of being mass-produced from low-grade materials. Mild steel was extensively used in the construction, and the thermal-duct propulsive engine was simplicity itself. The most costly part of the whole missile was, of course, the guiding mechanism. However, nations with aims of world conquest do not worry unduly about cost, nor, for that matter, about losses. Warfare may be the most inefficient of mankind's activities, but belligerents are primarily concerned with effectiveness as opposed to efficiency, and the long-range directed missile can become the most effective weapon known to the human race.

At one period during the recent world struggle

the Germans were scheduled to construct 10,000 of these pilotless aircraft in three months. This figure is of great importance when it is remembered that the Third Reich was at that time considerably weakened and short of supplies of both labour and materials as a consequence of the long war and the crushing blows of the Allied air fleets. In peace time any nation could, with relative ease, produce several thousands of such missiles and, secretly hoarded, they could one day be released with disastrous consequences upon an unsuspecting world.

The propulsive-duct engine of the V1 can also be adapted for use as an aircraft prime mover. Its employment in this way enables a large number of high-speed interceptor fighters to be quickly and cheaply produced. An impoverished nation could thus rapidly build up an air force capable of causing considerable embarrassment to fleets of conventional bombers.

Much more formidable, and likely to affect future wars, will the pilotless missile become if atomic explosives are used in place of the normal warhead. If employed in densely populated areas such as those of Europe, the destruction of the low-flying missiles before they reach their target would be certain to cause a great amount of damage; be this merely to the rural or suburban sections of the community. This is more evident when it is remembered that many of the missiles which were directed against London had to be destroyed over the surrounding countryside. A large number of V1's were accounted for over the sea, but in a sudden surprise attack such success may not always be attained. It is difficult to be convinced that the defences could be guaranteed to be in operation before the missiles had penetrated inland. In attacks from the European mainland against Lancashire and the Midlands. the damage to the surrounding areas could very well be tremendous, even though the actual target areas were saved by the defences. This danger similarly applies to all the inland cities and industrial areas of Europe and to those of the Eastern States of America.

The long-range rocket projectile is, however, a much more serious menace than the pilotless aircraft type of directed missile. The V1, owing to its short range and susceptibility to interception, may not greatly change present-day conceptions of warfare. On the other hand, the advent of V2 makes it necessary for mankind to take an entirely different view of the internecine strife to which life on this planet is constantly subjected. If, indeed, humanity is foolish enough to allow another war to take place, it is obvious that there would be no formal declaration. The aggressor would simply direct a large number of unex-

pected projectiles on to the nation attacked. These would hurtle through the upper atmosphere from great distances as swiftly and abruptly as meteors from interplanetary space. Guided by radar and wireless beams, perhaps with complicated mechanical controls similar to the integrating accelerometer of the V2, they would possibly be attracted to special beacons secretly installed by agents. The main centres of production and administration of the nation that was unfortunate to be attacked could, without doubt, be obliterated in a few hours.

Some people contended that the V2 was woefully inefficient when compared with the conventional four-engined bomber. They quoted comparative figures for the German rocket and a Lancaster aircraft. The former, they maintained, needed eight and a half tons of fuel to carry a one-ton warhead only 240 miles, whereas the latter carried several tons of bombs a distance of 3,000 miles for an expenditure of nine and a half tons of aviation spirit. A little thought shows that this apparent difference in performance is not so great as at first appears. Of the eight and a half tons of fuel consumed by the V2 during its flight, five tons were liquid oxygen. This substance, if mass-produced from the atmosphere, is available cheaply and in unlimited quantities, so that only the three and a half tons of the ethyl alcoholwater solution should be regarded as fuel (this liquid being comparable in cost with aviation spirit). The V2, as used against London, was also not operating under optimum conditions. By employing a 45-degree launching angle the range could have been increased to 300 miles, which means a range of 80 miles per ton of ethyl alcohol. How does the Lancaster compare with this? Firstly, a double journey is needed, so that the figures become about three-quarters of a ton of fuel per 100 miles of journey. As for the weight of explosive dropped on the target, the V2 becomes a three and a half ton bomb, containing one ton of high explosive and having a colossal kinetic energy due to its velocity of 3,000 miles per hour. The Lancaster delivers a few tons of bombs which are also partly constructed of heavy metal casing, but having nowhere near the same amount of kinetic energy.

Consideration of the specific case of weapons employed during the recent war thus shows that the difference between the over-all efficiencies of the bomber and the rocket is not so great as may at first be supposed by those not fully conversant with rocket theory. Generally, however, it can be shown that the bomber would not be nearly so effective in future conflicts as would suitably designed long-range rockets.

The rocket, for example, makes only one journey to the target. It is used only once—that is, for

its operational mission—and hence can be constructed from a bare minimum of cheap and mass-produced materials. The only part of the rocket which does cost a great amount is, as in the V1, the guiding mechanism. Even so, it was calculated by the Germans that a V2 needed but 4,000 man-hours for its construction. The longrange rocket, moreover, employs the most powerful engine at present available to mankind; for example, the V2 motor developed half a million horse power. A good power/weight ratio is achieved and in addition the rocket travels for the most part in or above the upper atmosphere where drag losses are negligible.

The long-range rocket also has all the advantages regarding the time factor. Whereas the bomber may take several hours to complete a mission, thus enabling preparation for the defences, the time of the flight of the rocket is measured in an almost equal number of minutes. Several missiles can be launched by the same crew with impunity, while an equal number of men could undertake only one hazardous mission in an aircraft. Although the rocket does consume more fuel than a bomber, it is a well-established fact that more power is needed if it is required to increase the speed at which a given piece of work is done. The rocket is the only method known to man whereby explosives can be taken thousands of miles in a few minutes and it is thus 100 per cent. efficient in this respect.

Again, with aircraft there are not only required operational air crews but also a colossal dead weight of administrative staffs, training and maintenance personnel which can be considerably reduced for the successful launching and operation of directed missiles. Tremendous advantages are also gained by the rocket in the fact that launching sites bear no comparison with aerodromes in cost, maintenance and vulnerability. An aerodrome presents a much greater target area than does a launching site, and may easily be put out of action by sufficient well-placed bombs. The defence of the small area of a launching site is much more easily accomplished than that of an aerodrome. The rocket is, moreover, completely independent of weather conditions, something which cannot be said for the bomber, even with radar and other modern navigational and bombing aids.

Large rockets, for long-range attacks, will be more efficient than the small ones which have so far been operationally employed. This is due, in some measure, to the fact that air-resistance losses do not increase proportionately with the size of the rocket. At the same time, large rocket motors are thermally more efficient than small ones.

Despite repeated assertions to the contrary by many perhaps well-meaning individuals, there is no limit to the range of the rocket projectile. All parts of the earth's surface may be reached from any country or, alternatively, may harbour launching sites for an attack on that country, With such a large choice of launching positions, an attacked nation would experience great difficulty in ascertaining the point from which the attack originated. Even if the missile were detected while in flight, very little time would be available for orbital calculations to be made. Three widely spaced and accurate positions of the rocket would be needed in order to calculate the orbit. It would, moreover, be useless to have one of these observations made during the powered portion of the trajectory. This is because there are many variables present, such as air resistance, thrust, and fuel consumption, which cannot be determined by the defence. Indeed, until the rocket has stopped firing and attained a certain velocity in a certain direction it is impossible to determine just where it is going. The actual orbit followed will depend, of course, upon the angle and the speed of flight when all the fuel has been consumed. An infinite number of orbits are possible at the time of take-off. These are gradually reduced as the fuel is consumed and the rocket turns from the vertical to the correct angle and ultimately the correct orbit is reached just prior to the complete exhaustion of the propellants. Because of this, therefore, there would remain perhaps only three-quarters of the total time of flight for obtaining the necessary three-dimensional fixes. The last of these measurements would, moreover, have to be made in the latter half of the flight in order to determine the trajectory with accuracy. For example, in the case of a long-range rocket travelling from, say, South America to the United Kingdom, it would be almost impossible to determine whether it was meant for other parts of Europe until the latter half of the trajectory could be observed. The extremely flat trajectories which are required for optimum elliptical long-distance shots are responsible for these difficulties of orbital calculations. As for the time available, a 3,000-mile journey would take about fifteen minutes, so that possibly less than five minutes would be available for the calculating machines—which are by no means instantaneous in their action—to determine the trajectory with sufficient accuracy to set into operation efficient offensive or defensive measures.

Bombers, in contrast, must make a double journey to and from the target area, during the whole of which time they are liable to interception. They need highly specialized crews with complicated ancillary equipment both for the aircraft and for its crew. The aircraft itself travels relatively slowly in dense atmosphere where the losses due to drag are great, and the engines are by no means powerful nor do they have a good power/weight ratio. A much greater loss is sustained if a bomber and its highly trained crew are intercepted than that which occurs if a rocket fails to reach its target. With developed defences, too, a much greater percentage of losses would have to be allowed for in future wars than that which was experienced in the recent one.

That bombers are destined to play a much less important part in any future conflict is emphasized by a consideration of some of the rocketoperated devices which were developed by the German technicians during the concluding phase of the recent European war. If the rocket-propelled defensive missiles of the Germans had been produced in sufficient numbers, there is no doubt that they would have become a serious menace to Allied bombers. Lack of co-ordination, and rivalry between the various production groups, between the S.S., the Luftwaffe and the General Staff contributed in no small way to preventing Germany from producing these antiaircraft devices in sufficient quantities. With them, nevertheless, if employed in large numbers, bombing by conventional aircraft could be rendered extremely costly and probably quite ineffective.

These devices included the Me.163 and subtypes which could climb to 40,000 feet in three minutes and which had sufficient speed to intercept even jet-propelled bombers. Also there was the B.P.20 Natter, another rocket-propelled interceptor fighter. This was even more extraordinary in its performance. Launched vertically, and using four solid-fuel rockets to assist its Walter Hwk.509 bi-fuel liquid rocket unit, it climbed at the rate of 37,000 feet per minute to a height of nearly 50,000 feet. A battery of small rocket proiectiles, housed in the nose of the tiny aircraft, could then be discharged into enemy bomber formations. There were also the X4 and similar types of air-to-air remotely controlled, rocketpropelled missiles, and the Rheintochter, Taifun, Wasserfall and other ground-to-air anti-aircraft rocket projectiles. The Wasserfall, for instance, was reported to have attained 25 per cent. success against aircraft, compared with the fraction of 1 per cent. obtained by normal anti-aircraft shells.

By employing developments of such devices as these, in conjunction with electronic control and proximity fuses, bombing by the slow-moving fleets of conventional bombers will be impossible. The effect would be to make bombing attacks almost as hopeless as attempting to attack a harbour with Elizabethan men-of-war when the defences consisted of modern motor torpedo boats. Slowly moving bomber fleets—that is, those moving at sub-sonic velocities—will easily be destroyed long before they can reach the target area. A single aircraft carrying atomic bombs would be even easier prey for the darting missiles of the defences.

Consideration of the relative merits of conventional bombers and directed rocket missiles thus shows that it is correct to conclude that the heavy bomber is destined to be superseded eventually by the long-range rocket. In the future there is no doubt that technical difficulties of guiding and constructing large rockets will be overcome. With the use of fuels which produce greater and greater jet velocities, and especially if nuclear particles can be controlled to produce an effluent stream, the unwieldy mass-ratio of a present-day transcontinental rocket will no longer be necessary. The problems of fuel-tank stress and other structural weaknesses will be for the most part eliminated. It will not be necessary to employ the awkward step principle or wing systems at present required to obviate the difficulties of the high mass-ratio required for transcontinental shots.

As for the accuracy of the long-range rocket, even nowadays without radar aids, it should be such that a rocket should reach within one mile of its target for each 100 miles of range. With electronic devices, however, the rocket should, according to calculations, have an error not exceeding ten miles in range and three miles laterally when employed against targets at 3,000 miles from the launching point. As will be emphasized later, the use of explosively liberated energy from the fission of atomic nuclei will make unimportant such errors as these. Future aggressors will aim, moreover, not at the destruction of pinpoint targets such as individual factories ar military installations, but rather at the complete and absolute annihilation of areas of production and centres of administration. To the individuals of the human race a vitally important fact must be kept in mind. This is that unfortunately the homes of the population will inadvertently be obliterated during such attacks. They will be wiped from the face of the earth as completely as if they had never existed.

Saturation of any available defences may well take place before the attacked nation could retaliate, especially if several hundred missiles were simultaneously in flight. The best that could be hoped for would be that the attacked country could dispatch its own missiles before annihilation took place and thus achieve complete des-

truction of the aggressor also. It has been stated earlier that the Service personnel which are required to man rocket-launching sites are so few in number, and thus any country can be completely mobilized at all times. The power of individual nations will depend, of course, upon the number of projectiles available to that nation. Most probably the actual number will remain a secret to the outside world, only to be revealed when the missiles are actually discharged, or at an appropriate moment in order to threaten other nations into submission. Indeed, the future outlook for mankind is extremely dark unless a world organization, preferably a World Government, is incorporated with power to subdue nations or racial factions which may develop anti-social tendencies or ideas of world domina-

If coupled with atomic energy, the long-range rocket will carry even more possibilities of death and destruction—possibilities which are almost beyond human comprehension. Moreover, as has already been suggested, no effective defence is likely to be evolved against such forms of attack. Despite claims to the contrary, the long-range rocket cannot be stopped any more successfully than can an artillery shell be arrested in flight or a bomb countered once it has been released from the attacking aircraft. The advent of V2, especially if atomic explosives are considered at the same time, has rendered obsolescent all large armies, navies and air forces. The maintenance of large forces of this nature would be a waste of a country's resources. In the future all available resources of labour and material must be used for the development of atomic power and its application in a force of directed missiles. Those nations which wish to have any military standing whatsoever in the coming years must not base their military development programme upon the conditions experienced during the last war. Only too often has this been the case with Great Britain, and she has found herself at the opening stages of periods of conflict very much lacking in both materials and useful weapons. Not only was this apparent in the quantity of arms but also in their quality and nature. Any nation is liable to utter defeat if it endeavours to conduct a war with tactics employed or weapons found effective in a preceding war. This is so even if the interval between the wars is merely a few years, but if, perchance, this interval extends to several decades, the nation may be mortally wounded before it can adopt the new ideas of its adversary. Because Great Britain, and the Royal Air Force in particular, achieved great victories through a strong Fighter and Bomber Command, there must not be allowed to develop a complex similar

to that of the "thin red line." Such forces were merely a stage in the development of methods of warfare and most probably have outlived their usefulness as far as major wars are concerned. The age of rocket power is now commencing and with rocket power the long-range missile becomes the most important method of waging war.

It will be necessary, therefore, for atomic power plants to be available in order that a nation may be fully mobilized at all times for defence. A sufficient number of directed missiles must always be held ready for retaliation against any aggressor, and atomic power will be needed for their effective use. Never again is it likely that the peace-loving nations will escape destruction by so close a margin as they did in the dark year of 1940. The new blitzkrieg will not be stopped by oceans or mountain ranges, nor will it admit of a later recovery of the nation against which it is directed. A first surprise attack will bring absolute victory to the belligerent nation. If nationalist policies are to remain on this planet, then each nation must maintain constant and eternal vigil lest its neighbours should suddenly run amok. Watch must be kept for the slightest untoward move.

In such a world, divided into petty individual states, the slightest suspicious action may well plunge humanity into a welter of destruction from which recovery would be impossible even in a thousand years. The face of the earth may be seared and left as barren as that of the moon. There can be no return to the old-world diplomacy and foreign policy which existed before and precipitated the recent struggle. No state of armed peace can possibly be tolerated by the intelligent sections of humanity. The long-range rocket has changed the progress of human endeavour and mankind must face this fact or perish.

Defence of the British Commonwealth and Empire may become more difficult than ever, but its widespread nature does form a natural defence in itself. This dispersal makes for a reduced vulnerability to attack by long-range rockets, providing the centres of administration and areas of production are decentralized in each constituent nation. It will be imperative that any aggressor nation of the future shall simultaneously destroy all the vital areas of the attacked nation. This would be accomplished with comparative ease in Europe and also, but to a lesser extent, in the United States of America, but it is almost impossible in the case of the British Empire and Soviet Russia.

If the maxim that "attack is the best form of defence" is adopted, then the British Commonwealth of Nations is extremely well situated in

this respect. British rockets could be launched from innumerable points on this planet, which could not easily be located and put out of action. The possible availability of large numbers of globally dispersed launching positions would make it very difficult indeed for any nation to prevent missiles from the Commonwealth from reaching their targets. This would be a direct consequence of the involved nature of the orbital calculations previously discussed, coupled with the resultant difficulties of interception. Soviet Russia would be somewhat similarly favoured for attack as for defence, but the United States of America and any Federated Europe which may eventually emerge from the present European chaos, would be at a great disadvantage. The establishment of Pacific bases by the United States of America will considerably improve the position of that nation in this respect.

Because of the density of population and the concentration of towns and industries, Britain herself is the weakest link in the chain of Empire defence. The ease with which the United Kingdom could be completely obliterated by atomicpowered rockets, which will surely be the threat from future aggressors, is enough to cause an involuntary shudder in thinking men. The peoples of these islands, with their culture and high degree of civilization which have taken many centuries to develop, could be completely destroyed in a few hours. It is horrifying to imagine the effects of the V2 on London in the recent conflict if they had contained warheads of atomic explosives. Doubtless the Germans, after the complete destruction of London, would have directed the attack against the provincial cities. Civilization in Britain would by now have ceased to exist!

The defence of the British Commonwealth of Nations must, therefore, hinge upon the vitally important fact that the United Kingdom must become an outpost rather than the centre of Empire. For effective protection, all vital centres must be scattered, administrative and highly important areas of culture and production must be transferred from Britain and re-established in safer areas, such as Canada or Australia, preferably in the former country. Finally, if a World Security Organization cannot be formed from the separate small states, it would be most advantageous for the United States of America and the British Commonwealth to unite as a federation of English-speaking peoples. An administrative capital, suitably planned to prevent destruction by long-range rockets, would have to be established somewhere in the New World. Such an amalgamation would be the prelude to the formation of a World State which may yet be necessary for the well-being of humanity and the establishment of lasting peace upon this planet.

Somewhat ludicrous in the light of the development of directed missiles and atomic power are the international air contingents which are envisaged in the Dumbarton Oaks Charter. They may well be out of date before they are formed. However, a World Police Force, as an extension of national police forces, may be needed for the successful operation of a World Security Organization. The air contingents could possibly form the core for such a force which could be used to stop disorders where damage to innocent people has to be avoided. Aircraft must necessarily be restricted in their use, but doubtless they will still find application for high-speed reconnaissance work, for local skirmishes, for transport, and for troop transports. It has been shown earlier that as weapons of large-scale war they cannot possibly compete with long-range directed missiles.

Throughout the major part of these arguments the rocket has been connected with atomic power. It would be rather a waste of time to do otherwise, for there is no doubt that nuclear fission will supply the power for such missiles in the years to come. Atomic energy will first find application in the explosive warhead before being adapted for the propulsive system. It has already been mentioned that the tremendously high jet velocities which will be obtainable from the fission products will considerably improve the mass-ratio for such rockets. With this application of atomic energy to long-range missiles, both as an agent of propulsion and a destructive warhead of unimaginable power, the formation of a World State becomes the only possible method by which destruction of civilization may be averted. The sub-division of various races into independent states is a retrogressive step in the path of human progress. Freedom of govern-

ment in regard to "foreign" policy is of little use if a nation is likely to be suddenly obliterated. Nevertheless, freedom of government can be preserved by the election of members to a World Council which will be empowered to control the "foreign" policies of the constituent states. The racial governments would look after their own internal affairs in a manner similar to that in which present-day local councils conduct their business. Matters affecting the world as a whole would always be settled by the overriding authority of the World Council.

The less-educated peoples of the planet must be made to understand, by force if necessary, that mutual co-operation and aid are vital for the preservation of lasting peace. There is no room for isolationist nations in a world which needs international policies for the survival of its civilization. Individuals must be taught that they owe allegiance to humanity as a whole rather than to separate racial groups. Elements which endanger the peace of the world and which refuse to comply with the general ordered progress of civilization must be eradicated just as surely as must the reverted tissues of malignant growths be cut out from the specialized and ordered cells of a human organism so that it may survive.

One world war which almost ended civilization has apparently still not convinced a great many inhabitants of this planet of the futility of the nationalist outlook. The inherent possibilities of remotely controlled long-range missiles should make all men fervently hope that another, more disastrous, war will not be needed to convince humanity finally that co-operation is essential for human survival. It may then be too late, for such a war might indeed bring peace upon this stricken earth solely because all intelligent terrestrial life would have ended.

Book Reviews

RED RAIN. By LESLIE KARK. 274 pp. (Macmillan & Co. Ltd.; 8s. 6d.)

A novel about a bomber crew shot down over Munich, tracing the story of each man's life up to that moment. One man only escapes. It is a gripping story, exceedingly well told by a man who knows his subject and can really portray his characters.

H. K. G. B.

JUNGLE PILOT. By BARRY SUTTON. 127 pp. (Macmillan & Co. Ltd.; 6s.)

If you read the publishers' blurb on the cover of this book first you will undoubtedly be disappointed.

The book gets away to a slow and rather tiresome beginning, after which Wing Commander Sutton is able to give some idea of conditions in Burma so far as they affected the small R.A.F. fighter force out there. The book is very short, has scrappy chapters and lacks any real interest or humour. In fact, I could see no obvious purpose in nor reason for the writing of it.

H. K. G. B.

To-morrow's Airliners, Airways and Airports. By

S. E. Veale. 337 pp. (Pilot Press Ltd.; 15s.)
In his Preface, Mr. Veale says: "In writing this book I have attempted to present, explain and comment upon some of the technical, economic, social and political problems facing the world on the eve of the rebirth of its commercial air services." He has done an admirable job, gone into his task with a refreshing enthusiasm and has put things down in a most readable and entertaining style. It is an excellent, tightly packed work, and can confidently be recommended to all whose work or interest lies in the business of air transport. H. K. G. B.

THE STORY OF THE AIR TRAINING CORPS. Edited by LEONARD TAYLOR. 66 pp. (Published by the Air League of the British Empire: 3s.)

This book consists of a number of articles and a great number of illustrations describing and showing the work of the A.T.C. since its founding in 1938. A very good three shillings' worth and an excellent souvvery good three shillings were enir for all who served in the Corps.

Memoirs of an Early Instructor

By Lieut.-Commander (A) F. Warren Merriam, A.F.C., F.R.Ae.S. (late R.A.F. & R.N.V.R.) (Continued from page 53, Vol. 17, No. 1)

VI.—1913

January of this year started with a busy round of tuition, in spite of wintry weather and open machines. Sunday afternoons were set aside for visitors. Pupils usually brought their friends, and those who were sufficiently advanced would be allowed to display their capabilities in handling a box-kite before admiring relatives. All pilots had their "fans," and were heroes, much in the same sense as film stars! It was encouraging to observe the budding enthusiasm of the public at that early date.

Many distinguished people came for joy-rides to test the thrills of the new sport. Major Sykes, who was the ninety-fifth certified pilot in this country, was then Officer Commanding the Military Wing, R.F.C., and he used either to send or bring his friends for me to take up. As they were mostly youths, it makes me think that he had a good foresight into the future of aviation, and did much to encourage it then.

Mr. C. R. Fairey, the well-known designer and constructor, was my passenger when I went to test Bristol machines for the newly-formed R.N.A.S. at Eastchurch. I believe it was his first flight, and he was able with his long arms to reach over my shoulder and feel my movements on the joy-stick. Fairey was then with the well-known Short brothers: Horace, Eustace and Oswald.

Major the Hon. C. W. Lowther, son of the well-known Speaker to the House of Commons, Lord Ullswater, also flew with me. He was most anxious to learn to fly.

Mr. C. C. Turner, a pioneer aviator and the first journalist to obtain his brevet, was my passenger several times.

Jack Alcock, who was knighted in 1919 for being the first to fly the Atlantic, accompanied me occasionally when I was testing, and took friendly tuition from me at the same time, as did the late Mr. Farnal Thurstan, a travelling representative of the Bristol Company, and A. W. Grant, who later became Works' Manager of the Bristol Company.

Mr. A. D. Lang, then manufacturing propellers, used to fly with me to test his propellers, and at the same time snatched flying lessons.

Lord Carbery, who was himself a well-known pilot, also went up with me.

There were many others, including wives, mothers and sweethearts of my pupils, not forgetting my own lady friends!

I have good reason to remember one lady passenger on the box-kites extremely well. If she should read these lines she may feel consolation in the fact that a similar thing, though certainly of a more disconcerting nature, happened to me later on with one of my war pupils.

I had, at her request, climbed to well over 1,000 feet so that she could have the thrill of a prolonged spiral descent. When above the aerodrome I switched off the engine, and stuck the nose of the machine down. Either the "switchback" or dropping sensation was too great a thrill, or else she was overcome by a fear that she was going to fall out, but whatever the matter was, she suddenly entwined her arms tightly around my neck and screamed, "Take me down, take me down!" I had to continue with the spiral as there was no hope of restarting the engine. I had already made up my mind where I was going to land and so had to proceed at this steep angle until, at about 400 feet, I flattened out and made an uneasy glide into the aerodrome for, during this time, I was being strangled, apart from the great difficulty I had in maintaining my balance and manipulating the controls. One has to study the picture of the box-kite to appreciate the awkward position I was in!

Speaking of spiral descents, they had a great attraction for visitors, but the steeper "corkscrew" descents were even more spectacular. These I always carried out alone, as it would have been very dangerous with a passenger. Owing to the practically vertical position of the machine whilst in flight, a passenger would have a strong tendency to fall on me, and if in addition to this he became giddy, which was quite likely, there would have been nothing to prevent his tumbling right over me and out of the machine, as we never thought of being strapped in.

It so happened that these and other antics on the box-kites earned me the dignified title of "The Box-kite King."

I was given a commission as lieutenant in the Legion of Frontiersmen. Col. Driscoll. D.S.O., our Commandant, came up once as a passenger for the purpose of sighting the Horseback Troopers who had hidden from us.

as pre-arranged, and when we eventually spotted them in the vicinity of Byfleet, we dropped a message to say that we had observed them. Incidentally, Col. Driscoll's son came under my instruction at the beginning of the

I was always nervous of flying as a passenger with any but my own pupils, in whom I had perfect confidence when they were well into the advanced stages of my training. I did, however, stretch a point with T. O. M. Sopwith on one of his new biplanes, and also with Monsieur Jullerot. They were both very coolheaded and reliable pilots.

I was to have flown with Graham Gilmore on his fatal flight, but was too busy to leave when the time came to take off. I helped him to get away, and shortly afterwards received a telephone message saying he had been killed

in Richmond Park.

When the wind was too strong for school work I used to take the pupils up for joy rides. which was all good experience for them. One favourite stunt of mine was to climb to about 3,000 feet, which was considered pretty high in those days, especially on a box-kite, and switch off the engine completely. Once this was done it was impossible to restart it, and then would come a real joy and sensation that could only be experienced on one of these "stick-and-string" early box-kites. quaint Imagine the silence, except for the wind making music against the struts and wires; or perhaps the voice of my pupil answering my "D'you like it?" No need to shout now. There is no deafening engine to drown our words Now, if we are lucky we shall meet the updraught of this approaching cloud . . . Yes, we've got it! . . . What a wonderful feeling, sailing on an invisible sea! And now for a spiral descent to the aerodrome. . . .

Will there ever be anything so exhilarating? In my opinion, no—not unless they bring back those old machines just for the sport of them. As for training, I think it is a pity that pupils are not given preliminary training on them

to-day.

I always had a dread of a mid-air crash, in common with all aviators. One day when I was up with a pupil I had a queer experience which temporarily took the stuffing out of me. It was a day when a lot of loose clouds were hanging about, and we were flying around them. Coming out of one of these, we were immediately confronted by another. The sun caught us at that instant, and cast a mirrorlike shadow of our machine on the cloud before us. It happened so suddenly and unexpectedly that for the moment I thought we were coming into collision with machine and I dived to avoid a crash, before fully realizing what had happened. Ah! well, all these things were sent to try us! It was an experience that I was able to pass on to others in case the same thing happened to them at any time.

The late M. Pégoud, the French aviator, and the first man to loop-the-loop, demonstrated to an enormous crowd of spectators at Brooklands at about this time. We aviators were not so much impressed by his thrilling circus performance as were the ordinary onlookers, but we were impressed by the manœuvres of looping and upside-down flying from a scientific point of view. It taught us that, given sufficient height, we could rectify a spin or any other untoward situation—if the machine did not break up. So, before seeking to emulate Pégoud's stunting we set about adjusting and strengthening our machines to bear the extra strain involved. The fact that these things could be done in the air imbued us with more confidence, and as we all know, stunting was invaluable to our pilots during the war in air combat.

On one occasion when school work was cancelled owing to weather conditions, I took a pupil named Pendlebury with me to visit the St. Nicholas Home for Crippled Children, near Byfleet. We arrived over the village at a height of about 3,000 ft., and, to quote the words from the Press, "made a magnificent spiral descent to the unbounded delight of the children who had been looking forward to the promised visit with great interest." The kiddies' joy certainly compensated me for the difficulty I had in getting away again, owing to the many obstacles in a restricted area. They begged me to come and see them again, which I did several times, taking small presents with me, but I had to leave my aeroplane behind as it was not wise to attempt another take-off in their grounds. I had been once, however, and that was enough. I was the "wonder man" to the poor little cripples. How little did I dream then that in a few years I should have a crippled daughter of my own.

People came for miles to see the flying at Brooklands on Sunday afternoons. Socially, it was a great event, and it was most disappointing to all if the weather prohibited flying. Our frail machines were unfit to battle against a strongish wind. If the aerodrome flag fluttered unduly, or the tree-tops swayed somewhat, it would be considered unwise to venture up.

On one of these afternoons there was a par-

ticularly large gathering, but no machines came out as there seemed little likelihood of the wind dropping. Thinking "nothing venture, nothing have," and just to show a little activity, I ordered a machine to be brought out—much to the astonishment of the other pilots. I made up my mind to do a short flight, which was accomplished with great difficulty. When coming towards, and in full view of, the spectators, a terrific gust of wind suddenly beat my machine down to within about five or six feet of the ground. The force and suddenness of it caused me to bounce right off the seat, banging my head against the top plane, then bouncing me back to the seat again like a rubber ball; but, by a miracle, and to the relief of everyone, I managed to grab the controls and effect a safe landing. Gustav Hamel, following me into the hangar, cautioned me that if I courted trouble in this way, he would be subscribing towards another wreath before long!

Hamel himself, however, often flew in circumstances involving great risk. I spoke to him many times about neglecting his machine, and I used to instruct my mechanics to adjust and mend parts to avoid it breaking in the air.

I was the subject, at one time, of much uncalled-for publicity through doing Hamel a personal favour. Headlines appeared in the press about a "Dashing Young Aviator," "Love in the Air," etc., and I was credited with this romance. In truth, it was Hamel who flew to Chertsey to keep an appointment with a lady friend! The part I actually played was to oblige him by flying ahead of him in order to conduct him to the best spot for landing, as I happened to be more acquainted with the ground there than he was.

It is believed that he came down in the English Channel and was drowned on 23rd May, 1914—a tremendous loss to us all.

About fifty pupils passed successfully for tickets from the beginning of January to 12th September, and Bendall and I had been so very busy that we had been unable to think of having a week-end off, let alone a summer holiday.

We were very pleased with the result of our work, however, and although we had no thought of beating other schools, our output of pilots throughout this period dwarfed the number turned out elsewhere.

We had been too occupied to notice that our successes had been causing a little jealousy in various quarters. Evidence of this first came to my notice in a very unexpected and crude manner, and took the form of a hefty punch on the jaw from an old flying colleague who

had concealed himself in the shadow of my office door, and waylaid me on my return from giving tuition! Pupils of mine, at that time, if they chance to read this, will remember the unfortunate incident and how, by force, certainly not by choice, I was bundled by half-a-dozen of them on to the school lorry and driven to my assailant's home to demand an apology. The motive of his behaviour was presumed to be jealousy. He explained that he was "a bit tight" at the time and could not think what prompted him to do such a rotten thing.

Incidentally, one of the party who accompanied me on this unpleasant errand was the late Lieut, Frank Beevor, a close friend of mine, and a pupil of the rival Vickers' school. This serves to remind me that my attention was next attracted to pupils who were coming from other schools, dissatisfied with their own progress, and enquiring whether it would be possible for our school to take them on. The fact that a number of Vickers' pupils hung around and seemed so interested in our school activities was most disquieting to my mind, because my old pupil and friend, Barnwell, was chief instructor there. I tactfully set to work trying to put these pupils off, but one or two who were determined to transfer to our school did so, and I was powerless to avoid it.

The reason for the success of our school was quite obvious. I was then the only instructor at Brooklands taking the risk of sitting behind pupils and allowing them full control of the machines in the air, and although Barnwell knew this method of mine well, for I had previously taught him the same way, he did not at first adopt it when he became chief instructor at Vickers, but he did later on. I could see that unless other school instructors, teaching on these box-kites, took the same risk as myself, they might as well pack up. Barnwell and Knight eventually realized this, after we had had a few friendly discussions on the matter, and in consequence Vickers' school began to flourish noticeably.

Amongst their pupils who became very famous in later years were the late Sir Sefton Brancker, Air Chief Marshal Sir Hugh Dowding, the late Air Vice-Marshal Sir W. G. H. Salmond, Air Marshal Sir W. G. S. Mitchell, Air Commodore L. Charlton, Group Captain R. Barton (of Air Service Training), Air Commodore S. W. Smith, Mr. R. K. Pierson (the well-known Vickers' designer), and Mr. J. Lancaster Parker (Short Brothers' chief test pilot).

Barnwell, a brother of the late Capt. F. S. Barnwell, chief designer of the Bristol Aero-

plane Co., both early pioneers of building aircraft, was never really cut out for instructional work, but he excelled at testing experimental machines and did much of this dangerous work. He flew to see me at Chingford early in the war, but was killed a day or so after whilst flying, just at the time when good experienced pilots, like himself, were in great demand.

Returning to the subject of instruction there were very few who cared for the job. It is a natural gift to instruct and instructors are born, not made. This was more evident in 1911-12, when flying was so much in its infancy, and it was not expected that a newly fledged pilot could at once acquire the patience and other inherent abilities required to teach others. A good pilot was not necessarily a good instructor. On the other hand, a good instructor had to be a good pilot and, coupled with this, had to be temperamentally of a specific type and not easily ruffled, possessed of untiring patience, and able to study each psychologically and physiologically. These qualities were rarely to be found together, however. The few instructors at that time varied between the exigent, the overcritical, the hasty, the apathetic and the over-

At the Salisbury school there were six good, experienced pilots, but apparently they lacked the essential qualities needed for instructing, with the exception, perhaps, of Busteed. The Salisbury school was no exception, for at the other fifteen civilian and two Service schools then in existence the system of teaching was rather worse, which goes to prove the scarcity of instructors in the true sense of the word.

I was deeply fond of flying, and often wished I could break away from the eternal drudgery of school work. I longed for adventure and wanted risk and the opportunity for experimental work, but somehow I was bound to teaching by some indescribable influence; and in any case, I was always too busy to break away from it. It was not often that I could get any time to myself even after flying hours, as there was always a merry crowd at the "Blue Bird," where we lodged, and the one incessant topic was flying and yet more flying!

I used to take pupils to the skating rink at Woking sometimes in the school lorry. On one very cold night we were stopped by a policeman. Our rear light, a paraffin one, had blown out only a minute or so before, but when the constable felt it to ascertain whether it was still warm, it was stone cold, which was not surprising, owing to the very frosty air. Still, it

rather suited him to be unreasonable. Almost every other "bobby" in that district knew us, and in this case would have cautioned us and let us pass, but this new man had other motives. I hardly know what possessed me but I produced my pilot's certificate and asked him to read a small paragraph inscribed therein, which was as follows: "The Civil, Naval and Military Authorities, including the police, are respectfully requested to aid and assist the holder of this certificate." This had immediate effect, and with apologies from the "limb of the law" we proceeded on our way. I tried this dodge once or twice later and each time it was successful. May I suggest to pilots of to-day to try the same thing when they exceed the thirty-mile limit or "jump" the traffic lights! The police around Brooklands were a very sporting crowd on the whole. Most of them had flown with me and had enjoyed the experience.

One dark night I had been to Weybridge alone, and was returning by the short cut to the aerodrome, through a narrow lane, when a voice shouted "Stop! Stop! "I hesitated for a moment, a little uncertain at this abrupt challenge, when close came the voice again, "St-o-op!" I recognized its owner to be that well-known test pilot, the late Gordon Bell. Still, he persisted, "Who's th-that c-c-coming? . . . I'll sh-sh-shoot you!"

"This is Merriam," I shouted. "You know who I am!"

There was silence then, but as I approached he pointed a revolver at me, exclaiming, "I w-w-was j-j-just g-g-going to sh-sh-shoot you!" He explained that on the previous night he had been waylaid and robbed, and was waiting in the lane hoping to catch the offender. It was a good job for me that his actions were not quicker than his words!

If this story should claim the notice of any old-timers it will rouse affectionate memories of an old friend who stuttered, and one of England's best pioneers, about whom there are many amusing stories.

One day, after several hours of strenuous morning tuition, I had returned to my "digs" to get in some much-needed sleep. The weather had changed for the worse. Before going to my room I instructed my landlady that I was not to be disturbed on any account as I was very tired. I had just settled down to sleep when someone banged on my door in a most alarming manner, and after pushing the landlady aside, came bouncing in on me. The intruder turned out to be Mr. Pemberton Billing.

"What the devil do you mean by coming in here," I demanded.

He made apologies for his rude awakening, but assured me that it was most important to see me, and nothing would have prevented his doing so, I am sure, for he explained that he must get his brevet in a day to win a bet of £500 made with Mr. Handley Page! The thing had to be done, and he considered that I was the only man who could help him. I was keen to take him on and, forgetting my fatigue and annoyance, in half-an-hour was telephoning headquarters for their consent. It was not surprising to me, however, when the Secretary, Mr. Henry White-Smith said it could not be done as, apart from the stupidity of the request, it would obstruct the ordinary school work.

This was a great disappointment to "P.B.," but I took him along to Vickers' school and introduced him to Barnwell, whose firm also refused to take the responsibility. So an old Henry Farman box-kite was brought to the rescue and Barnwell took the risk of giving him private tuition. "P.B." later that day qualified for his ticket, which was officially observed by Mr. Rance for the Royal Aero Club.

It was a terrifying ordeal indeed. We who watched held our breaths at the hair-raising behaviour of his machine stalling badly on right-hand turns, and performing other amazing feats. Sensation-loving onlookers would doubtless have been thrilled by what appeared to be a masterpiece of "crazy flying," as they are to-day when visiting aerial displays, but they did not know how near their quest for sensation came to being gratified.

Thus the wager was pluckily won and the greatest possible credit was Barnwell's for the tremendous risk he took in sitting behind in the passenger seat when giving "P.B." tuition. I might mention here that Barnwell adhered more or less to my system of instruction; had he not done so, in my opinion "P.B." would never have got through in the time.

Pemberton Billing and I met again in the second year of the war when he was a Flight Commander, R.N., and came to me for advanced instruction on an Avro biplane. We all remember that he was conspicuous later as a Member of Parliament and a strong advocate of aviation.

On another occasion, when returning from a jaunt to the skating rink late one night, with a number of pupils on the school lorry, I was struck by the brilliant moonlight and the still air. So, on return, we got a machine out. It was not advisable to give the usual instruc-

tion under this light, but the pupils in turn enjoyed the novelty of a lesson from the passenger seat. This was not the first time I had been up by the light of the moon. In fact my fiancée (now my wife) was my passenger on an occasion previous to this, late one evening after school work, and we landed when it was quite dark. This was a really unique experience then. I must add that my small daughter flew with me early in 1912. She was about six years old at that time and had to sit on the knees of one of my pupils. I believe I am right in saying she was the first youngster to fly, and she revelled in it.

Many interesting pupils passed through my hands in 1913, amongst them being G. C. Merrick. He was a very difficult and slow pupil and was really too old to learn flying; but he was a brave and charming man to know. Perseverance on both our parts resulted in gaining a certificate for him.

About five months later he was killed at Upavon when he fell out of his machine, a Short biplane. Presumably the accident was caused when making a steep glide into the aerodrome. He must have slipped out of his seat and fallen forward on to the control, causing a vertical dive which pitched him out and killed him instantly. Had he been strapped in, the accident would never have occurred.

Lord Edward Grosvenor took his ticket on 29th August, 1913. He was one of my heaviest pupils, nevertheless one of the quickest, and he did much to foster aviation before and after the war, being well in the front rank of our sporting flyers. He was the fourth British pilot to loop-the-loop. He kindly gave me a memento—one of the first aeroplane altimeters, reading to 6,000 feet, made by Callaghan & Co., London.

The late Mr. R. R. Skene, another brilliant pupil who was learning about the same time, was the next one to follow suit in this great stunt of the day, which was performed on Blériot monoplanes in both cases. By the way, the distinction of being the first passenger to loop belongs to Mr. Vernon Jones, on the staff of Flight. He looped with M. Louis Noël at Hendon.

Perhaps a few words about a friend may not be amiss here for it was early in this year that aviation mourned young L. F. MacDonald, who was only twenty-two years old when he met his death on 13th January, 1913. MacDonald was the first pupil of the Bristol Flying School to get his ticket, on 15th November, 1910, brevet No. 28. When we met he was assistant pilot to Captain H. F. Wood at Vickers, who was

fourth pilot of our school, certificate No. 37.

At the time of MacDonald's fatal crash he was testing a tractor for Vickers at Erith. It appeared that before he took off his engine was giving trouble, and while still at a low altitude, with the engine revving insufficiently, the machine began to lose height. He endeavoured to turn back but was too late and came down in the Thames with his mechanic, Mr. H. England, who was also drowned.

I have many times thought of a conversation I once had with him about engine troubles when he emphasized the "grating" effect of the sound of a faulty engine to him. For example, he compared it with the unpleasantness of a yapping dog. It was almost embarrassing to witness his peculiar intolerance of a barking dog. He used to cover his ears with the palms of his hands as if to shut out the sound of some terrific explosion when a dog barked near him.

I have always found it difficult to believe that he took off, carelessly ignoring his engine. I felt very sorry for Macdonald because I was strongly of the opinion that he was not in good health.

I remember so well taking a snap of Lieutenant J. Crawford-Kehrmann, with his mother and sister. He was a delightful pupil to teach, and was, I think, the first officer in the Royal Flying Corps to be killed in action in France whilst flying. His death was another hard personal blow to me.

We had a narrow escape together one morning during flying tuition when we collided with the Pashley brothers' machine in a fog. The Pashleys took the case to court, and won it. The affair was a novelty for the Law Courts, as judge nor counsel knew much, if anything at all, of the ways of airmen and their craft at that time. The general view taken of the smash was in favour of the Pashleys and that it was imprudent on my part for allowing a pupil to have full control. A press cutting from my scrap-book gives an account of the collision:

"Mr. F. Warren Merriam had a fortunate escape from death on Saturday week. He was at the Brooklands Aerodrome, and at 7.45 a.m. went up to test the air conditions previous to taking up a pupil, Lieutenant Crawford-Kehrmann. At 9.30 a.m. they commenced a short flight, Lieutenant Kehrmann being in the pilot's seat and having control of the machine.

"After Mr. Merriam and Lieutenant Kehrmann had gone out, Mr. Pashley went up on the Sommer biplane, but a thick fog coming up quite suddenly, he had to make a hurried volplane to earth, which he reached quite safely. He was just in the act of turning his machine

round when through the fog he espied the Bristol machine coming towards him at right angles, and as neither pilot was aware of the other's proximity it was not possible to do anything to prevent the violent collision which occurred and which badly damaged both machines. Luckily no one was hurt, although all three had a very narrow escape, for the Bristol machine was thrown up on to one side by the force of the impact, and only the strength of the stanchions prevented the engine breaking loose, and the machine speedily recovered its balance. Some idea of Mr. Pashley's narrow escape may be gathered from the fact that the gauge glass, which was fixed to the machine by the side of his head, was knocked off. In the afternoon, Mr. Merriam was out on the Bristol tractor.'

Indignation was aroused amongst us pilots when members of a certain institute which had been holding its sittings in London, offered what we considered very unattractive terms, namely, the sum of £5, to give them a flying display. To pay them out for their insult we allowed our visitors to come in full expectation of a regal welcome, but alas, we had prepared to give them only a burlesque demonstration, by means of all the schools turning out their old wrecks, of which there were plenty, and which when lined up for exhibition resembled an auction sale! On arrival, our visitors viewed all in a very puzzled way and were annoyed when they discovered that they had been ridiculed. In the end our hearts softened towards them for having been brought so far to be fooled and we gave them a show without accepting any payment.

I shall always remember the stir it created when a rumour reached us that suffragettes intended to storm our hangars one midnight. The knowledge of their amazing destructive powers was not comforting and could not be disregarded, so a number of fellows conferred together, and rather than consult the local constabulary, decided to handle the fair sex by themselves. The method of punishment would have been effective had they been given the opportunity to carry it out, for the arrangement was to lie in wait all night in the hangars and catch them red-handed, then strip them of all their wearing apparel and turn them out! I am bound to confess there was considerable disappointment when the suffragettes did not turn

No little excitement was caused one day by an unusual coincidence, a description of which is given in a press cutting:

'Brooklands was favoured by a sight which

has never been seen on any other English aerodrome except, perhaps, at Farnborough, for in the afternoon a monoplane, a biplane, a dirigible, and a spherical balloon all disported themselves over the aerodrome at one time. Mr. Harold Barnwell was up on the No. 5 Vickers at something like 6,000 feet; the new "Beta" from Aldershot, with Lieut. T. G. Hetherington, R.F.C., as pilot, made a circuit of the aerodrome and went off without landing; Mr. James Radley and Lieut. Waterlow, R.N., arrived at the same time in a Short balloon from Battersea; and Mr. Merriam, on one of the Bristol school biplanes, amused himself by flying circuits round the balloon and dirigible. The balloonists landed for tea and went off again, reaching Witney, in Oxfordshire, in the early morning, this being the first balloon to land at Brooklands, though many attempts had been made. After the dirigible had gone, and the balloon was in process of alighting, Mr. Knight, on a Vickers biplane, also amused himself by flying round it.'

Following closely upon this memorable event in April, a German Parsival airship, ordered by the British Admiralty for the Royal Flying Corps (Naval Wing), flew over Brooklands and London from Farnborough, this being its first flight in this country. Amongst the passengers were Capt. F. Murray Sueter, R.N., who created the Royal Naval Air Service, and Lieut. F. L. M. Boothby, R.N., a pioneer of flying. The ship was piloted by Major Stelling, assisted by Herr Schaak, who had with him two German mechanics.

It attracted a great deal of attention in consequence of the rumours circulated regarding previous mysterious visits by German airships over England, which had caused unrest to a certain extent in the public mind.

Glancing through some of the Brooklands Automobile Racing Club's official race cards, which I have retained as relics, I am reminded of another noteworthy event, that of the June Aeroplane Handicap of 1912, in which Lieut. W. G. S. Mitchell, a popular pupil of Vickers' School and an extremely fine flyer, "starred." He won first prize, beating such pilots as H. G. Hawker, on an 80 h.p. Gnôme Sopwith biplane, R. H. Barnwell, on a 50 h.p. Gnôme Blériot monoplane, A. Knight, on a 60 h.p. R.E.P. Vickers Monoplane, A. Dukinfield Jones, on a 45 h.p. A.B.C. Flanders biplane, M. Ducrocq, on a 50 h.p. Gnôme Henry Farman biplane, E. G. Andreae, on a 50 h.p. Gnôme Vickers biplane, W. Bendall, on a 50 h.p. Gnôme Bristol biplane, H. Spencer, on a 50 h.p. Gnôme Spencer biplane, and myself on a 50 h.p. Gnôme Bristol biplane.

For the amusement of present-day pilots, it would be interesting to mention the conditions of the race. The distance was about twelve miles. The prizes ranged as follows:

1st.—50 sovereigns. 2nd.—25 sovereigns.

3rd.—10 sovereigns; or cups, at option.

Three had to start, or no race; four to start, or no second prize; five to start, or no third prize. An out-and-home cross-country race for all classes of aeroplanes. The result, as copied from the race-card, was: 1st, Mitchell; 2nd, Merriam; 3rd, Ducrocq.

The fact that a pupil was the winner caused considerable leg-pulling and much amusing talk.

Capt. Penfold, one of the best-known and most courageous of Australian aeronauts, who had toured all over Australia in a balloon, making numerous parachute descents, on land and sea (some very thrilling ones too—especially when he had to dodge sharks in Sydney Harbour), came to this country to learn to fly a heavier-than-air machine. He visited various aerodromes and flew with many pilots to gain experience. I did not think he had the makings of a pilot, however, when he flew with me, and I did not press him to take it up on account of his deafness, for he was almost stone deaf. He wrote to me after he left to thank me for my help, and saying that he believed he would be a flyer yet—if not a "star," at least a "twinkler." He must have had many miraculous escapes during his career for, as he told me, he had broken almost every bone in his body.

Lieut. G. Blatherwick, R.N., who did some very good work throughout the war, did his first cross-country flight under quite unique conditions in March, 1913—by moonlight. No better explanation of the experience can be given than by quoting from *Flight*:

"Tempted by the lovely evening, at midnight last Saturday Mr. Merriam went for a cross-country flight on the Bristol biplane, taking up with him Lieut. Blatherwick, one of his promising pupils, who was delighted with the novel experience. It was perfectly calm and clear, ideal for flying and quite safe, but, of course, it was frightfully cold, being a frosty night."

Lieut. R. E. Peirse (now Air Marshal) has had a truly splendid career, and was one of the easiest to teach.

He wrote me from Bath on 25th April, 1913: "I am writing to thank you very much for the amount of trouble you have taken in teaching me the antics of a box-kite and I fully realize

how much I am indebted to you. Will you please accept the small memento from Morgan and myself with much appreciation from us both."

The memento referred to was a pocket spirit flask engraved with the date and signatures of Peirse and Morgan. The flask was most useful on many of my cross-country flights and patrols, but unfortunately, during one of the latter, I dropped it and smashed the glass. I still cherish the fragments for sentimental reasons.

Lieut. T. W. Mulcahy-Morgan was a fellowpupil of Peirse's. He went out with the gallant first squadrons to France in 1914, and although I have lost account of his work, I remember him well as a very pleasurable pupil to teach.

One other memento I prize very much bears the signature of Mr. L. H. Strain, K.C., a very keen and popular pupil. It was a gold matchbox and, like the flask, has been "through the wars," but is not disabled and is always a reminder of the happy days I spent with the donor.

I have a mingled sense of pride and sadness when I go through these letters from old pupils. I live through those days again as if they were but yesterday. The sincere words of gratitude I read from so many, the various little mementoes or, as I prefer to call them, "keepsakes," so poignantly remind me of some of the dearest and best of fellows to whom it was my good fortune to impart knowledge and experience.

Here is another sad ending to a pioneer Army pilot, Capt. W. Picton-Warlow, who did such good service during the war. When flying home from France he disappeared, presumably in the sea. He was a charming man, the kind who makes one feel the better for having associated with him. He obtained his ticket on 1st April, 1913. He sent me a wrist-watch to commemorate the obtaining of his ticket. The wrist-watch nearly shared a similar fate to that of the donor, for I was wearing it when I had a very narrow escape from drowning, a few years later—a story I shall tell later on.

In 1913, things were making appreciable strides in aviation. New types of aircraft were steadily being introduced, and an increasing number of pilots were being turned out.

It was a welcome change to have different pilots popping over to see us. Some would come to visit their old instructors and friends, others to demonstrate the capabilities of a new machine for selling purposes. Amongst these were Mr. Geoffrey de Havilland, Colonel Cody, Mr. Busteed, and Mr. P. C. Hucks.

Cross-country flights were becoming quite popular, too, but these were carried out with

no small factor of risk and rarely without incident. One always felt anxiety for a cross-country air visitor, until a telephone call came through to say he had reached his destination, even after a forced landing somewhere, or lost bearings, engine trouble and, of course, inexperience.

A good deal of that fine old fellowship still lingered amongst us. Thoughtfulness to spare others undue anxiety on these occasions was still apparent. I will show one example in the form of a telegram sent to me from Squadron Commander P. A. Shepherd, one of the original R.N.A.S. officers who came to Brooklands on a practice flight from Eastchurch—considered to be a lengthy journey then—and wired me on his return from Sittingbourne: "Arrived Eastchurch eight. Good trip. Many thanks for your kindness.—Shepherd." The kindness he referred to was the various little adjustments my mechanics made on his machine for his homeward flight. This return flight was carried out early in the morning after staying with us the night.

Bendall, who had been assisting me so admirably with school work for about twelve months, unfortunately had to give up flying after a struggle with broken nerves due to a flying crash. He did so with tears. I, too, was very affected, for we had worked in perfect harmony throughout this period. He was much liked by all the pupils and staff. I do not know what became of him for I have not seen or heard of him since, but his splendid work for aviation we shall not forget.

I see in one of my copies of *Flight* of this time, a paragraph giving reference to our activities at the school, which runs:

"At the Bristol School, where Mr. Merriam, its energetic instructor, has been working single-handed since Mr. Bendall's retirement owing to ill-health, there has been much activity during the past week, no less than seven pupils having passed their brevet tests in excellent fashion; namely, Capts. Jackson and Evans, of the Staff College, Camberley, Lieuts. Darley, Mead, Lewis and Cameron, and Mr. Kwong Wong—a fine week's work. Lieut. Darley, R.F.A., passed his tests particularly brilliantly, rising steadily to an altitude of 2,000 ft., the greatest height ever attained by a pupil, and effecting a landing close to the mark after a well-executed spiral descent—a performance of which both he and his instructor, Mr. Merriam, may well feel proud, and one which should materially help Lieut. Darley in his future career as a member of the Indian Army branch of the R.F.C., at Secunderabad, where he hopes to be stationed. Mr. Merriam has now secured an assistant in the person of Mr. R. R. Skene, an old pupil who recently passed his brevet tests under Mr. Merriam in a most workmanlike manner, at an altitude of 1,600 ft. Mr. Kwong Wong (whose four brothers are now on their way to this country to follow in his footsteps) made particularly rapid progress, having only been up once by himself before passing his tests, during which he attained a height of 250 ft., and made very good volplane landings."

There was keen competition amongst the pupils for the height record, and Darley, having well overlapped that of a Vickers' School pupil, Frank Beevor's 1,750 feet, was reasonably well pleased and no less disconcerted when he realized he had a close rival in Richard Powell. Darley left Brooklands next day and sent a postcard to Powell saying: "If you break my record (2,000 feet) I'll come and break your neck." Powell's neck is still intact, however, despite the fact that he beat Darley's record by 250 feet—a grand feat then—and as far as I can remember was never beaten by a pupil before the war.

Lieut. J. Mead, who was in the Royal Fusiliers, turned out to be a very safe flyer, but had trouble in getting through his eyesight test for the R.F.C. His sight never interfered with his flying when learning, however, and it was never necessary for him to wear glasses. He eventually got away with it and gave valuable service throughout the war.

Mr. Kwong Wong started his tuition at the Ducrocq and Lawford School, Brooklands, under E. H. Lawford. He had been well grounded by Lawford before coming on to me, which accounted for him taking his ticket quickly. I ought perhaps to mention that Wong came to our school when Lawford left Brooklands to introduce the Champel biplane 100 h.p. Anzani pusher, the identical machine in which Sidney Pickles and Mrs. Stocks, his passenger, crashed and were both badly injured. Lawford was the first pilot to fly from London to Paris at the inauguration of civil aviation on 25th August, 1919, and was later at Croydon Airport.

Capt. A. Roche, who flew to France with the first Squadron on 21st January, 1915, and whose machine, a Blériot, and body were found in the sea near Dunkirk, I shall always remember as a fine flyer and a real friend.

Mr. R. Skene was not favourably impressed with school work, having a special "kink" for testing, so he soon took leave of our school and became one of the foremost test pilots.

He was given a commission in the Royal Flying Corps and was one of the first to fly to France and also, unfortunately, one of the first to be killed. He was a fine and noble fellow.

Then came Mr. F. B. Halford, now the famous aero-engine designer. He was a very steady and cool-headed pupil and, after taking his ticket, was keen to stay on to gain more experience. I was glad, too, to find another of my own pupils with a propensity for instructional work and I persuaded the firm to engage him. He became a very able assistant. There were many expert pilots in the firm but I particularly needed someone who was acquainted with my system of teaching and there was nobody better suited than one of my own pupils.

Halford, like many more then, soon got tired of instructing, unfortunately, and I had most regretfully to part with him as he was anxious to get on to the experimental side of the Army Aircraft Factory, Farnborough. I was glad to be able to help him to this end by putting in a good word for him to the right quarter. He sent me a picture postcard on 7th April, 1914, of one of the first B.E. Army aeroplanes with the figures 206 on the rudder. On the back of the card he writes, "I started here yesterday and am settling down rapidly, and am very busy. We start on the Military Engine Competition next week so we shall be pretty busy for a few months as engines will be running day and night . . ." (It was on this type of B.E. aircraft that the late Lieut. Robinson brought down the first Zeppelin over England.)

Two incidents during the time Halford was at Brooklands must stand out in his memory. One was when a certain gentleman came to our school to learn to fly, whilst suffering from D.Ts. I tried to teach him and then handed him over to Halford, who took him up one morning for instruction. The pupil must have been drinking most of the night, and at 1,000 feet he had an attack and insisted on doing exactly the opposite of what he was told to do! Poor Halford who was sitting in the back seat was frightened to death, but fortunately he quickly realized that the only thing to do was to shout to the pupil to do exactly the opposite of what he should do, and by this means he got him down safely. We eventually managed to get him through for his ticket, but his first solo flight looked like a trip on a scenic railway!

The other incident was when the same pupil bought a Caudron biplane before he could fly properly and set off on a cross-country flight to visit a lady friend. We all foregathered in

the "Blue Bird," betting how many miles he would get from Brooklands before killing himself. Actually he tried to land in a garden, and when he realized it was too small, crashed while trying to get out with his engine still switched off!

I can think of no other business or profession in which those called upon to instruct pupils in those days had to work so long, had more need of patience and less of nerves, and who took greater risks with less thought of them, than the pilot-instructor. For him there was little rest. He had to be an early riser, arriving on the aerodrome directly it was light to test personally the machines and the air, and to make sure everything was right. The assistants were generally old pupils who had obtained their brevets and were kept on at the school, their work being to instruct the beginners. In most things, it is the commencement that is the difficult part. In learning to fly, however, it was exactly the reverse. The commencement was comparatively easy, the lessons not only getting more difficult as they progressed, but the danger increased.

In addition to the work as pilot-instructor, I had the management of the business to attend to and a log of all lessons and flights made by pupils had to be entered up and progress reported every day to Headquarters.

Machines had to be overhauled and inspected, as it was surprising what a lot of small damage the machines sustained in the course of tuition work. It was sometimes difficult to locate minor defects, but if they were not discovered and rectified, more than likely it would lead to a crash later on. The mechanics would have to be supervised and instructed to "put this right" or "strengthen up that," as the case may have been.

One of the most important figures on the aerodrome was "Whisky," the little Irish terrier, a pioneer air dog. He was everybody's pet, particularly mine, and was as fond of the mechanics as they were of him. He was extraordinarily partial to flying, just as the dogs of to-day love motoring, and used to wait patiently for the machines to land, for a friendly pat, or better still, a joy-ride. His familiar little figure would haunt me were I to omit him from these pages.

Like most schools, at about the beginning of October we began to slacken down, and at the most could only raise about half a dozen pupils. I welcomed this slackness for I had long hankered after some experience on the newer types of aircraft, and I seized the opportunity to go for a while to our other school at Lark-

hill, near Salisbury, the firm being quite agreeable. It was, however, a wrench to sever myself from the old school, even as a temporary measure, and I wrote to the firm:

"Referring to our telephone conversation respecting my transfer to Salisbury, I should like to explain that I have deferred my departure from Brooklands until early to-morrow morning. I am doing this in order that I may have the opportunity of leaving things straight in Mr. Pixton's hands and also to get several pupils off on solo flights. As a result, Capt. Wallace and Lieut. MacNeece-Foster went on solo flights for the first time to-day.

"I wish to express my appreciation to the firm for thus allowing me to obtain further experience on tractors and monoplanes.

"I hope to complete this experience very soon in order to lose no time in resuming charge at Brooklands. This, I am sure, is in the firm's interest as well as my own, for, as you are aware, I have been fortunate in obtaining many of the pupils here by personal recommendation, from which I may infer that my methods of instruction are appreciated here.

"I hope to reach Salisbury to-morrow and

start work immediately."

I duly arrived at the Salisbury school. If I had imagined for a moment that I was going to have a complete change from school work, I must have been sadly disappointed. As soon as I arrived on the aerodrome, the Salisbury pupils clustered around me and I was not long in finding out the reason, for they soon had me busily instructing them, and I had to be content with what little practice I could get on these new machines in the intervals of instructing.

M. Jullerot, a Frenchman who became a Major in the Royal Flying Corps during the war, and who was decorated with the Air Force Cross, was manager and chief instructor at Larkhill, with Herr Willy Voigt, a German, and one of his former pupils, as assistant. Fortunately, Jullerot showed no resentment at my being in such great demand; in fact, he seemed glad to have my assistance. Voight, too, was keen to have advanced tuition under me and flew with me a lot on the monoplanes.

The first thing that impressed me about Salisbury Plain was the unlimited space for landing, so unlike Brooklands with its notorious sewer, railings, railway line, trees, scattered hangars, and other obstacles. I argued with myself which was the better of the two. From the school point of view, I was in favour of Brooklands as an aerodrome. It is generally known that the most important thing

about flying is landing. At Salisbury, with such a large area, pupils had only to concentrate on a straightforward landing. At Brooklands, they required good judgment to land between the various obstacles, and I came to the conclusion that, in spite of the unlimited landing-ground at Salisbury, Brooklands was the place I should choose for school work, for there pupils were compelled to concentrate on landing in a confined area at all angles, with the result that they developed a much finer sense of judgment. I knew that pupils who passed for their brevets at Salisbury were, in a sense, only half-trained as compared with those at Brooklands.

At Salisbury there were restrictions regarding the landing spots, of course, but if a pupil had not gauged his distance he knew perfectly well that there was plenty of space and no need for worry. Later, however, if flying across country he should be faced with the necessity of a forced landing, he would discover that the far-reaching pasture land of Salisbury Plain was a vast playground for his toy in school days and that he had still much to learn.

Hearing that I was at Salisbury, an invitation came from some of my previous Brooklands pupils at the Central Flying School at Upavon, asking me to pay them a flying visit. I chose a monoplane and a pupil, Lieut. Harvey, came with me. It was a very pleasant trip and a very cordial reception awaited us.

The Commandant, Capt. Godfrey Paine, R.N., and Major H. M. Trenchard, who was second-in-command, made us very welcome, with the result that we left rather late. We ran into a thick mist which obscured all landmarks. We came down near Newton Tony, being overtaken by darkness, and landed as best we could. Having done so without mishap, we then secured the machine for the night. Lieut. K. Dunn returned with me the next morning to collect it, and we discovered that I had narrowly escaped a serious crash, for there was only a small margin between the spot where the machine had come to rest and a steep precipice. There was still a mist about and the return journey was exceedingly bumpy.

I loved flying the monoplanes and preferred them to the biplanes, as they gave me more satisfaction and I felt that I was really flying like a bird. Some of the monoplanes, though, were frightfully dangerous and could well be termed death-traps at that date. They should never have been used for instructional purposes, as they were the cause of several fatal accidents. I will not go so far as to say that the blame could always be attached to the air-

craft construction, for much could be said against the inexperience of the pilots, but it is known that on several occasions these machines broke up in the air. Hotchkiss was flying a Bristol monoplane at the time of his fatal accident, the machine breaking in the air. A previous Brooklands pupil of mine, Mr. Geoffrey England, also met his death in the same way.

My stay at Salisbury was brief, only about a fortnight—but at its expiration I had gained the amount of experience I had set my mind upon for the time being and was fresh to return to Brooklands again.

There were renewed activities at the old school. Some of the Salisbury pupils whom I had instructed there were missing me and were writing to Headquarters and to me asking if they might be transferred to Brooklands. Their requests were granted.

Capt. H. E. Walcott, who joined our school and came through his tests triumphantly, wrote:

"I should be grateful if you would let me know how many pupils you have at Brooklands. Capt. Fell and I have been here about ten days, hoping to fly, but owing to indifferent weather and other causes, Fell has only been up twice and myself only four times. I have been advised by an officer in the Flying Corps, who knows you, to write and ask you if you would recommend our coming to Brooklands instead of remaining on here. Or is there any chance of your coming here shortly?"

Lieut. J. D. Harvey, R.N., who followed me from Salisbury a few days after I left, wrote from Byfleet:

"Just a line to thank you for pushing me through so quickly, and more particularly for the magnificent judgment you displayed in landing me on the mark."

A letter from Lieut. K. Dunn said:

"I'm afraid I've been a long time writing to thank you for risking your neck with me on Salisbury Plain, but you know it was appreciated. It takes nearly a week for Flight to get over here so one is apt to get a little behind the times. I see the account of our great crosscountry flight in 'very bumpy weather' in last week's number. Has Tod done in the mono' yet? I hope you passed that medical exam. all right. I had a very bumpy time coming back here. The papers said there was a tornado and we were an hour and a half late. I think I shall give up crossing the Channel in a boat. I'd sooner get the bumps a bit higher up!"

Both Harvey and Dunn were anxious to know if I had passed my eyesight test at the

No. of Pupils

Admiralty for the Naval Air Service Reserve. Unfortunately I had not.

Sub-Lieut. G. R. Bromet, R.N., wrote:

"Ever so many thanks for the excellent tuition I received at your hands. I learnt more in my three days with you than I was likely to learn in three years at Larkhill. I only wish I had gone to Brooklands in the first place. There seems no chance of my getting into the Royal Flying Corps this year as the list is so full."

So many Naval and Army officers who had spent their spare time and their money in learning to fly found it was not easy to transfer into the small Flying Corps, which had only just been formed. I was happy to find that most of my pupils, whom I personally recommended,

were successful in being accepted.

The year 1913 was now drawing to its close. The last, and very outstanding, pupil was Lieut. E. D. Maxwell Robertson, R.N., who lived at Weybridge and had to travel to the Admiralty every day to be on duty there, with the result that he had to fit in his lessons in the mornings and evenings. Then it seemed the weather was most provocative, for too often a fog settled on the aerodrome, and he made several disappointing journeys. Finally, an arrangement was made that the first one on the scene phoned him regarding the weather conditions. He was as much at home in the air as on the sea.

I close these pages on a truly happy and

successful year.

In 1912 we had constituted a record in producing the highest number of pilots in this country, but in 1913 we had capped even that. One interesting feature that I was glad to note was that a number of my pupils were instructing at the new service Central Flying School, Upavon, and at one or two civilian schools also.

The History of British Aviation, 1908-14, sets out the record of the British Schools for 1913 as given in the table below.

Mr. Dallas Brett comments:

"The Bristol School had now reached its peak. Mr. Warren Merriam had achieved the apparently impossible by forcing the output of the Brooklands branch up to seventy, and an improvement in the Salisbury Plain section had resulted in a gross output from the two schools of almost one pilot every three days, or well over two pilots weekly. This was surely one of the most astonishing feats in the whole history of aviation. Mr. Warren Merriam, Mons. H. Julierot, and their able assistants deserve the very highest praise. Between them they had trained only nine short of the total number of pupils who qualified at all the sixteen other civilian schools of flying put together. It was phenomenal."

	and a discount of the state of
	trained
School.	Aerodrome. during 1913
Bristol	Brooklands (70),
	Salisbury (47) 117
CEC (DEC)	
C.F.S. (R.F.C.)	Upavon 56
Vickers	Brooklands 35
Naval School (R.F.C.)	Eastchurch 29
Ewen	Hendon 25
Grahame-White	Hendon 19
Deperdussin	Hendon 12
E.A.C	Eastbourne 12
Blériot	Hendon 8
R.F.C. (Military Wing)	
K.I.C. (Williamy Wing)	
m 1	Montrose (4)
Temple	Hendon 3
Blackburn	Hendon 2
Ducrocq	Brooklands 2
Avro	Montrose (4) 8 Hendon 3 Hendon 2 Brooklands 2 Shoreham 2
CI 1	Shoreham 1
	17 1
Hall	Hendon 1
Beattie	Hendon 1
Melly	Freshfield Lancs 1
Percival	Brooklands 1
Lakes F.S. (Seaplanes)	Windermere I

The Royal Air Force Accountant Branch— Its Early History

BY VINCENT BRENNAN, M.B.E., F.R.G.S.

HEN the Royal Air Force was first formed on 1st April, 1918, the pay accounting system was very different from what it is at present. In fact, there were two separate systems working side by side, one for officers and another for men. There were no accountant officers and no accountant staff on each R.A.F. station.

It is true that officers drew their pay from the R.A.F. agents largely as they do now, but their

allowances were issued by the General Services Pay Office. Men were paid weekly by a unit officer. These payments were entered in pay and mess books, which were forwarded monthly to the Central Pay Office, Woking, where they were abstracted to a central record.

These centralized arrangements gave rise to a certain amount of dissatisfaction. There was often delay in payment and both officers and men had difficulty in ascertaining exactly how they stood

at any one time owing to the fact that their accounts, as a whole, were not readily available for examination. This dissatisfaction culminated in the appointment, by the Air Council, on 20th October, 1919, of a Committee, under the chairmanship of Rear-Admiral C. F. Lambert, then Director of Personnel, "to discuss and report on the method of payment of the officers and men of the Royal Air Force and to make recommendations."

In its report, submitted to the Air Council, the Committee questioned the economy of the existing system, which involved separate machinery for officers and men. They could not see how complaints as to unpunctuality in payment and uncertainty as to balances due to men were to be obviated. Further disadvantages lay in the duplication of work as between the units and the centralized offices and also in the fact that, at the former, cash was necessarily held by unskilled and ever-changing personnel. They felt that the solution lay in the decentralization of all this work to stations where both pay and stores accounting should be entrusted to trained staff.

They recommended (a) the appointment of an accountant officer at each station, to be responsible, under the commanding officer, for the whole of the accountancy work, both pay and stores, and (b) the abolition of the General Services Pay Office, the Central Pay Office and the R.A.F. agents as such. The accountant officer should keep a cash account, to be sent monthly to the Air Ministry for audit. Officers' and men's ledgers were to be maintained as in the Navy, and sent quarterly to the Air Ministry for audit. Officers and men would allot any of their pay as they wished and receive the balance locally from the accountant officer, monthly in the case of officers. weekly in the case of men. Allowances, such as for fuel and light, lodging, etc., would be credited on the ledger and paid currently on the station. Travelling allowances would also be paid on the station, but "separation" allowances would be dealt with by the Air Ministry.

The responsibilities of the accountant officer in connection with stores were also defined.

In the final paragraph of its report and following as a natural result upon its recommendations, the Committee suggested that "a small Committee of expert officers be appointed to draw up regulations and draft orders so as to enable the new system to be brought into force on 1st July, 1920."

It is believed that there is now no longer a copy of the report of this latter Committee in existence and it has therefore been thought desirable to place the following personal recollections on record lest the circumstances in which the R.A.F. Accountant Branch was formed and the present R.A.F. pay and store accounting systems were established be lost in obscurity.

The second Committee, which was called the Pay Regulations Committee, was appointed in March, 1920, and consisted of:

Rear-Admiral C. F. Lambert (then Director of Personnel), Chairman.

Squadron Leader (now Air Commodore) C. G. Smith.

Squadron Leader H. A. Michell.

Mr. E. M. Knox (of Finance).

Mr. V. T. Brennan.

F./Lieut. (now Air Commodore) P. J. Wiseman, Secretary.

Wing Commander Napier Gill joined the Committee at a later date.

I had served in the Department of the Accountant-General of the Navy from 1901 until the date of my transfer to the Air Ministry in November, 1919, and was presumably appointed to the Committee because of my knowledge of the naval methods of accounting upon which the new R.A.F. system was largely to be based.

It was a whole-time job and the members of the Committee sat continuously during 1920, drawing up the regulations and instructions which eventually became embodied in Air Publication 796 to be issued at a later date. The Admiral was naturally concerned with his wider duties as D. of P., but he attended the Committee meetings from time to time and took a lively interest in its proceedings. It was his influence and driving force which saw it through the difficult time to come. Joint meetings were also held with another Committee which concentrated on the system of store keeping and accounting.

Towards the middle of 1920 it became evident that opposition was in the air.

Under the system newly proposed it had been intended that officers should draw their pay locally instead of, as heretofore, having it credited to them on the books of one or other of the R.A.F. agents. This would have entailed the extinction of the R.A.F. agents as such, on the expiration of the notice of six months which their agreement with the Air Ministry provided. Not unnaturally, this gave rise to strong resistance to the new scheme from certain quarters which came to the notice of Mr. Winston Churchill, then Secretary of State for both War and Air. The deliberations of the Pay Committee were suspended. and it looked as if its members would be returned to their normal jobs, at least for the time being, to resume only if decision at the high level at which

negotiations were now proceeding should render this necessary.

The Admiral, however, had other ideas. He believed that if the Committee once dispersed, the difficulty of reassembling it might prove an added obstacle in the way of the adoption of the new system upon which he had set his heart. He therefore gave instructions for the Committee to continue to sit, even if it had nothing to do. And it was for the three longest weeks I remember that we sat, doing nothing—waiting for the die to be cast.

Meanwhile, as we subsequently learned (for at the time discussion took place under a veil of secrecy), the broad matter of principle at stake was remitted to the arbitration of the late Sir Laming Worthington Evans, who in due course produced a solution which was an admirable compromise.

He approved of the new arrangements as a whole, subject to one proviso. Officers were to be paid their allowances, travelling claims, etc., by the local R.A.F. accountant officers newly to be appointed, but were to continue to draw their pay, as heretofore, from the agents, save in the case of those officers who should elect specifically to draw their pay locally as well. This was approved by the Air Council, and the Pay Committee resumed operations on the new basis, completing its labours finally towards the end of 1920.

The new scheme now formulated, it remained to bring it into being.

Under the system shortly to be superseded, R.A.F. men's pay and allowances were administered from the Central Pay Office, Woking, under the command of Group Capt. Stoney, C.B.E.; while officers' allowances, bills and other miscellaneous payments were dealt with at the General Services Pay Office in Great Newport Street, London, under the command of Group Capt. H. C. Ellis, C.B.E. The appointment of officers of the new Accountant Branch to individual stations would entail the gradual disappearance of the two huge central organizations as their work was transferred to these stations or "pay accounting" units, each with its own accountant officer or officers according to its size and importance.

But these officers, of whom rather over a hundred were needed to begin with, had first to be found, and then trained, in the new procedure, and, in most cases, in the R.A.F. Pay Regulations.

It was early in 1921 and many officers in all the three Services were thinking hard about their future employment. Those who, because of their past experience or for other reasons, appeared likely to be suitable for the new branch were given an opportunity to volunteer for probationary commissions. Some were naval paymasters,

R.N. or R.N.R., some came from the Royal Army Pay Corps, others were R.A.F. officers with a "pay" background. For a variety of reasons the process of selection had to be done against time and it is to be feared that in several instances the choice was not a happy one. But as time went on this righted itself. A few officers failed to survive their probationary period. The net of entry was tightened.

The task of training the "recruits" was entrusted to a chief instructor, Group Capt. Stoney, referred to above, and to three assistant instructors, F./Lieut. (now Air Commodore, retired) H. J. Down, F./Lieut. P. J. Wiseman and the writer, who was seconded from the Air Ministry for the purpose.

Training began in February, 1921, at the R.A.F. Station, Andover, and continued until October of that year, during which time the selected officers went through courses in successive batches of twenty or thirty. The writer well remembers the night of the arrival of the first party. They were not expected and nothing was ready. He was one of those who spent the night in a dressing-gown in front of the fire.

The course at Andover was confined to pay accounting, and instruction in store accounting was given elsewhere at a later date. At the end of each course there was naturally an examination and continued employment depended upon passing this.

As qualified officers became available they were appointed to stations, or "pay accounting units"—and so, by the end of 1921, the system had been brought into being.

It remains to make a further reference to the compromise suggested by Sir Worthington Evans, whereby officers were to continue to draw their pay from the agents unless they elected to be paid locally. In general, the result was that those officers of the Royal Air Force who had previously served in the Royal Navy or the R.N.A.S., who were therefore accustomed to receive their pay from their ship's paymaster, elected to continue to draw it locally. In nearly all other cases, including those of ex-Army officers, they were habituated to the agent system and desired to make no change.

It would be interesting to know to what extent, if any, the twenty-five years which have passed have affected this.

Certain it is that the Lambert Scheme proved to be a success, at any rate under peace conditions. It remains to be told—at a later date and by someone with a knowledge of current affairs—how it has borne the strain imposed upon it by the War.

Memoirs of an Unsuccessful Wing Commander

BY WING-COMMANDER S. BOLLAS, N.Y.D.

(The names of persons mentioned in these papers are their real names, and the events described are far from fictitious. Let Justice be done and Truth be made manifest.—S.B.)

CHAPTER I.—CRANWELL WAS OUR CRADLE

RANWELL! The very goal of boyhood's ambition! That thought was uppermost in my mind as the luxurious super-coach swung round the corner by the Post Office and slowed to a standstill before the stately edifice of corrugated iron that for two happy years was to be our home.

Thère, standing on the steps to greet us, stood the Commandant, a stately figure in full canonicals, greeting us with a merry smile—a joke for one, a pinch on the cheek for another, a shyly proffered slab of peanut brittle for a third, and so on all along the line. When it came to my turn to step forward, his manner seemed to change a little. He looked at me gravely.

"And what is your name, my little man?"

"Bollas, sir," I replied.
"What the—what did you say to me?"

"Bollas, sir. Samuel Bollas."

His brow cleared, but he said no more and turned on his heel to lead us into the mess. Alas, I know not why, but my relations with senior officers have been strained from the outset, ever since that day.

But this was all long ago, before my service talents were matured, and before I had learnt the bitter lesson that merit must oft go unrecognized and unrewarded! This was Cranwell, in 192-, and so let us return to the ante-room, where the Commandant stands pouring us great fragrant cups of tea. And the Staff officers, shy but friendly, are pressing dainty sandwiches and petits fours into our not unwilling hands.

Seated in a richly curtained alcove, beside a terra-cotta statue of Colonel Cody in the costume of a Roman senator. I drink in my tea and the animated scene. There, chatting easily with the Assistant Commandant stands Jack Strongley, from whose watch-chain dangle the gold and silver trophies of his prowess on the cycling-track. His massive frame and jovial laugh contrast strangely with the personality beside him-Jacob Blackburger, whose slight figure and suave manner are belied by the dangerous glitter of his rimless pince-nez. Ah! Jacob, Jacob, had you but gone to Sandhurst or the Poly instead of Cranwell, I should be a Group Captain now, and Jack Strongley's bones would not now be at the bottom of the Welsh Harp! But I must not anticipate . . .

So many of my commanding officers have asked me how I came to enter Cranwell that I feel I had better explain it once and for all.

My father was a poor but industrious Brigadier-General, who made his living on the burning sands of India. I saw him but once, when he returned to London on leave and came to see me in the nursery. I was about five years old at the time, and had already begun to suffer a little with the eczema that has cost me so much worry ever since. How well I remember the day when he appeared to me! Screwing his monocle into his eye, he gazed at me for several seconds in silence before uttering a strange Eastern exclamation of amazement. "Khor Blaimi!" he muttered, "Khor Blaimi!" and vanished. I never saw him again.

My education was undertaken by a series of governesses, for my Mum thought I was too delicate for school. None of these governesses stayed for very long, but to Miss Clutterbuck. last of the series, I owe a very great deal of my savoir faire and insouciance.

She was passionately interested in horse-racing, and in order to leave herself time for pursuing this hobby she made me enter for course after course with a celebrated Correspondence College. The arrangement was mutually satisfactory; in two years she was, she averred, £1,600 in on her turf account, while I had managed to collect first-class diplomas in correspondence courses on such diverse subjects as Accountancy, Window Display (Art), Commercial Bee-keeping and Eurhythmics.

On the night of my seventeenth birthday I had retired early to bed and was engaged in reading up Lesson 4 of the course in Canine Surgery when there came a thud at the door and Miss Clutterbuck entered, bearing a bottle of gin. She seemed excited about something.

"Sam, my boy, we're made for life. Got a tip-wonderful tip-for the Derby. Wonderful, wonderful tip. You take this slip to Izzy Cohen in Clement's Inn to-morrow, and don't forget it or I'll do you. D'ye hear?"

I had run errands for her before, but had never heard of Mr. Cohen.

"Whereabouts in Clement's Inn, Miss Clutterbuck?"

"—well find out, and don't forget to. It's

a wonderful tip."

I promised not to forget, and she stood there, swaying gently. "Sam, my poor little Sam. Seventeen years old and doesn't know the facts of life. Poor little Sam. Here's a book that'll tell you all about it."

From her handbag she produced a well-thumbed copy of "Fifty Useful Things a Boy Can Do," and laid it solemnly on the table beside my bed. Then, breaking into the opening stanza of an old folk-song which I now recognize as "My Wife, the Maid and I," she tot-

tered to the door and disappeared.

The following morning she did not appear at breakfast, so I went down to Clement's Inn and started to look for Mr. Cohen. Several other young lads of about my own age were entering the building, so I followed them in. The proceedings seemed rather formal, for I had to sign my name in a book and was told to sit in a dingy waiting room which was full of battered copies of the *Aeroplane* and a silent crowd of shy and anxious youths.

One by one we were called away for a series of interviews with men who seemed more interested in medicine than the turf, and after meeting one particularly embarrassing request with some difficulty I gained the impression that this might not, after all, be the right set of offices. Just as I was meditating departure I was summoned to "the President." At last, thought I, I understand; Mr. Cohen's little business is not quite above board—he covers his activities with all this mystifying medical business.

The subsequent interview was fraught with misunderstandings. The President, a man with a shrewd and knowing eye, talked at great length of the R.A.F., of my eczema, of some examination I was supposed to have taken, and of some unheard-of place or event near Lincoln. At

length my patience was exhausted.

"Mr. Cohen," I said, "for such I believe to be your name, you talk in riddles. Let us have no more of it, I beg you. I have not the faintest interest in the R.A.F. My eczema is my own misfortune and I would thank you not to be personal about it. I have passed no examination, but you may look at these my diplomas for Accountancy, Window Display (Art), Commercial Bee-Keeping and Eurhythmics, if you think they would interest you. As for the Lincoln, sir, you know damned well that you and I are more interested in the Derby." And with that I passed him Miss Clutterbuck's note.

He took it suspiciously, but as he read it his

expression changed. "Is this information reliable, would you say?" he asked. I explained Miss Clutterbuck's long run of successes. He then made some quick telephone calls, informing friends of the "wonderful tip" and laying out bets with his bookmakers. Finally he turned to me.

"Look here, young fellow, this is a bare-faced attempt to bribe your way into a respectable institution. I've never heard of such a scandalous proceeding—you ought to go to jail for it. But I'll make you a fair offer. If this horse of yours comes in you can go to Cranwell and we'll say no more about it; if it doesn't win, then—God help you—I will report this to the police. Now get out!"

I got out. In due course Miss Clutterbuck's "wonderful tip" romped home at 33 to 1; the following day my joining instructions for Cranwell arrived, and to flee my governess's fury at my blunder I boarded the 1.15 from King's

Cross for Sleaford . . .

So let us return to Cranwell, where the anxieties of the first few days were quickly replaced by a wealth of happiness and camaraderie unequalled by anything in later life. Nestling in a sheltered corner of the warm Lincolnshire uplands, Cranwell fostered devotion to duty through the fascinating syllabus of lectures and encouragement to prowess on the sports field.

In a typical day we would rise at seven, partake of breakfast followed by a little refreshing drill, and then hey! for the "Triple" block for an interesting talk on coefficients of friction; or perhaps to the English Professor for a debate on Rupert Brooke; or even to the workshops, to make a useful little wire splice. Then there was flying—so important to us professionally—when we would ascend in all weathers (lashed to the controls on stormy days) to learn the art of steering the giant Avro 504 through wind and weather.

Then would come a substantial luncheon, and an afternoon at quoits or either sort of football; or a wild dash after the fleet-footed and intelligent beagles. On a Wednesday we would have a guest-night, after which it was not uncommon for the fourth-term to invite the first-term to their huts for a cosy chat, and to listen appreciatively to the first-termers' criticisms and suggestions on the running of the squadrons.

The time slipped by so fast that we were in our fourth and final term (though some of the keener fellows stayed on for a fifth) before we realized we were very nearly fully-trained fighting warriors. But the happiness of those closing weeks was clouded over by a dastardly outrage whose fatal consequences are not yet fully worked out.

At the time, Jack Strongley, Jacob Black-burger and myself shared a hut, and although Jack and I were ill-pleased at having to share our domestic life with the sinister Jacob, we consoled ourselves by sending him to Coventry, even excluding him from our evening P.T. classes. Though we little realized it at the time, this thoughtless incivility was rankling in Jacob's breast, and he was planning revenge in his own cowardly fashion.

One summer afternoon I returned early to the hut to fill up my Sports Log Book, and was startled to see Jacob standing close to Jack Strongley's bed. He turned as I came in, and I noticed at once that he wore a savage scowl and that his mouth was covered with biscuit crumbs. His hand, too, was covered with a bloodstained bandage. I asked him suspiciously what he was up to, and he told me, with a vile oath, to mind my own —— business. Nothing loath, I went on out of the hut to catch the bus to Leadenham, but as I went I noticed a distinct trail of bloodstains and biscuit crumbs leading from the hut towards the hospital.

I thought nothing of this at the time, for I was due to sing at the Leadenham harvest festival and was hurrying to keep the engagement; but when I returned to camp just before "Lights Out," the place was in an uproar.

Hailing a passing Wing Commander, I was informed that during the afternoon the matron of the hospital, hearing suspicious sounds in the back of the premises of the Sisters' Mess, had gone to investigate and had surprised a masked man, in cadet uniform, rifling the kitchen stores. She had immediately drawn her automatic and fired three shots at the intruder, who had disappeared through the window with a tin of fancy biscuits under his arm; but from the stains on the windowsill it was believed that at least one of the bullets had found its mark.

As this narrative unfolded I was struck dumb with grief and shame; what cur among us had done this thing? But worse was to follow.

I was told that a hut-to-hut search of the

cadets' lines had immediately been ordered; that the trail of blood and crumbs leading to Jack Strongley's bed had been quickly discovered, and that the fatal biscuit-tin, half emptied of its fancy contents, had been discovered beneath his bed. Jack had at once been called to account for this, but his inability to prove an alibi, and a recent wound on his arm—caused, he protested truthfully but vainly, by a bite from a beagle—had clinched the case against him. While being dragged to the guardroom he had broken away from his guards and, undaunted by a hail of bullets, had made good his escape in the direction of Sleaford.

In a flash the truth came to me; that afternoon—Jacob's suspicious attitude by Jack's bed—the crumbs on his lips—the bloody bandage on his hand—the trail towards the hospital. I. and I alone, could unmask the real criminal!

Brushing my helpful informant aside with a curt word of thanks, I sped straight to the Commandant's residence and was granted an immediate interview. Within the hour I accompanied the Commandant and a posse of stalwart airmen to the hut, and had the savage satisfaction of seeing the treacherous Jacob marched away in irons.

. . .

Three weeks later we celebrated the end of our sojourn at Cranwell, but with heavy hearts; the events of that fatal afternoon cast a shadow over our revelries. True, Jacob Blackburger had been brought to the rough-and-ready justice of a court-martial, but through some flaw in the proceedings he had been condemned to nothing worse than a transfer to the Equipment Branch. Jack Strongley, on the other hand, had returned to camp on hearing that his name had been cleared, but had been charged with the trivial offence of breaking arrest, and was transferred to the General Duties branch in the rank of Aircraft Hand (G.D.) and had been banished from our company. Even the matron had got a severe reprimand for bad marksmanship. It was with an oppressive sense of foreboding and the Gold Medal for Divinity in my pocket that I staggered into the tap of the "Blue Crumpet," Grantham, on the last day of term.

Post War Code of Pay, Allowances, Retired Pay and **Service Gratuities for Commissioned Officers**

(COMMAND PAPER 6750)

GENERAL

71.—(i) There has been a review of the pay codes for officers serving in the general service, i.e., the Executive, Technical, Supply and Administrative Arms of the Services. The new codes will result in a broad equality of treatment between officers of the three Services, and the present disparities between the Services and within each Service will be removed.

RECRUITMENT AND CAREERS

(ii) There will be certain changes, particularly in the Army and Royal Air Force, in the methods of recruitment of permanent officers. In all three Services there will be opportunities for obtaining commissions from the ranks, and other rank service will be a necessary antecedent to entry to the Army and R.A.F. Colleges, which the cadets will attend as enlisted soldiers and airmen.

(iii) There will be promotion by time up to and including the ranks of Lieutenant-Commander, Major and Flight Lieutenant. In the Army promotion to the ranks up to and including Major will be at an accelerated rate as compared with

the pre-war position.

(iv) The single officer will normally be provided, in addition to pay, with accommodation and rations in kind and the married officer will normally receive pay, marriage allowance and rations or ration allowance.

(v) Officers will receive an outfit grant on first appointment, if not provided with outfit in kind.

(vi) The main changes in the pay systems will be as follows:

(a) Royal Navy.—Officers of the Executive, Engineer, Electrical and Supply and Secretariat Branches will have a common scale of basic pay. Extra pay will be restricted to officers in command of sea-going ships and to

flying and submarine officers.

(b) Army.—There will be a common scale of pay, on a simplified basis, for all Arms other than those specified in the footnote to paragraph 25. Staff pay, Corps pay and other forms of additional pay (except parachute pay and flying pay) will be abolished. A system of qualification pay on a single scale for all Arms will be introduced for officers of the rank of Major and below with not less than two years' commissioned service. Command pay and "in

command" rates of pay for General Officers will be abolished, provision being made for allowances for official entertainment.

(c) Royal Air Force.—Except in the ranks of Pilot Officer and Flying Officer, where the pay of the General Duties Branch will be higher than that of other Branches, the same inclusive rates of pay will apply in the General Duties, Technical, Equipment and Secretarial Branches, though the age of promotion will

vary with the Branch.
(vii) The new rates of pay are designed not only to simplify the present pay system and remove the present anomalies between and within the three Services, but also to effect a general improvement, over the career as a whole, as compared with pre-war rates (i.e., excluding the present War Service Increments). There is no considerable change in the rates for junior officers in their early years, but there is provision for a more substantial increase at about age 26, with further increases, in general, in the higher ranks.

(viii) The new pay scales provide in all three Services for biennial increments of pay up to and including the ranks of Captain, R.N., and Colonel

and Group Captain.

(ix) The new pay scales for the three Services take account of the ages at which the various ranks are normally reached.

MARRIAGE ALLOWANCE

(xi) The new marriage allowance system, which will apply uniformly to the three Services, will provide for variations only according to the rank of the officer and not according to the size of the family.

(xii) The qualifying age for officers' marriage allowance will be reduced from the pre-war limit of 30 to 25. There will be special arrangements for certain categories of officers, e.g., officers commissioned from the ranks, who may be married before age 25.

(xiii) Family allowances will be payable under the provisions of the Family Allowances Act in respect of the second and subsequent children of officers.

OTHER ALLOWANCES

(xv) There will be a simplified system of allowances in place of the various allowances which may now be granted in lieu of provision in kind (rations, accommodation, etc.).



(xvi) Dominion or Colonial allowance will be continued. Field allowance will be abolished in due course, and Mediterranean and Far East allowances will be replaced by such Dominion and Colonial allowances as may be required; but these changes will not take place before 1st July, 1946.

(xvii) War service grants (including emergency grants) will not form part of the post-war code for officers and will be dealt with as set out in paragraph 29 of Command Paper 6715.

TAXATION

(xviii) Marriage allowance and composite lodging allowance (which will absorb fuel and light, furniture and servant allowances) will be treated as taxable income of the officer. This will take effect from 6th April, 1947, when the current year basis of assessment will be applied to all officers (and men).

(xix) Legislation will be introduced to exempt provision and ration allowances from tax. Dominion or Colonial allowance, and allowances for official entertainment, will not be liable to tax.

NATIONAL INSURANCE

(xx) Subject to necessary modifications, the Service officer and his family will be eligible for the full range of benefits of the National Insurance Scheme, or broadly equivalent benefits (e.g., medical attention) under Service arrangements. The insurance system for officers will be based on the same general principles as the arrangements to be laid down for other ranks.

RETIRED PAY AND GRATUITIES

(xxi) There will be a new and simplified scheme of retired pay and gratuities which will be common to all three Services. The rates of retired pay will, in general, be substantially more favourable than the maximum rates under the present

(xxiii) Subject to the special arrangements applicable during the currency of the present release scheme, officers retired in the normal course in future will receive 28 days' leave with full pay.

TREATMENT OF SPECIAL WAR EMOLUMENTS

(xxiv) Service will continue to reckon for war gratuity up to the anniversary of VJ Day, *i.e.*, 15th August, 1946.

(xxv) Service will cease to count for the purpose of War Service Increments from 1st July, 1946.

(xxvi) Japanese Campaign Pay will be reviewed in the light of circumstances, but will not be withdrawn before the anniversary of VJ Day, i.e., 15th August, 1946.

CLASSES OF OFFICERS REMAINING TO BE DEALT WITH

(xxvii) Certain special categories of officers are reserved for further consideration. These include the Medical and Dental Services, Chaplains, officers on legal and educational duties, officers of the Royal Marines, Warrant Officers of the Royal Navy, men commissioned from the ranks at relatively late ages or for limited duties, e.g., as Quartermasters in the Army, and British Service Army and R.A.F. officers on Indian rates of pay. Officers of the nursing and Women's Services, and officers of all Services recruited overseas, are not covered by this Paper.

APPLICATION OF NEW CODE

(xxviii) The new rates and conditions of pay and marriage allowance will be brought into force on 1st July, 1946. There will be special arrangements for dealing with cases where rates of pay, plus War Service Increments, are being drawn on 30th June, 1946, at amounts in excess of the new rates of pay.

(xxix) There will be a special temporary scheme of supplementary marriage allowance designed to ease the position of certain married officers whose net emoluments may be reduced by the introduction of the new system and rates of marriage allowance (subject to tax).

(xxx) The new scheme of retired pay will come into operation immediately and will apply to all officers granted permanent commissions after the date of publication of this Paper. Subject to certain reservations in favour of officers serving on the date of publication of this Paper, it will also apply to permanent commissioned officers who were serving on the active list on the date of publication of Command Paper 6715 (19th December, 1945), or who have been granted permanent commissions since 19th December, 1945. It will not apply to officers already on the retired list on 19th December, 1945, but consideration is being given to the position of retired officers who have given full-time service in the Armed Forces in the 1939-45 war.

(xxxi) The new scale of gratuities will apply to officers appointed to permanent commissions after the date of publication of this Paper, with certain reservations in favour of permanent commissioned officers already serving.

PROVISION FOR FUTURE REVISION

(xxxii) The new codes of pay, allowances and retired pay will not be subject to automatic revision, e.g., by reference to the cost-of-living index or other set formula.

(xxxiii) The rates of pay and marriage allowance will be subject to review from time to time, though changes will not be made except in the event of a marked alteration in conditions. Any such changes in rates which may be made in course of time will apply without exception to all officers then serving, and there will be no arrangements for granting reserved rights on a permanent basis to individuals to whom the rates and conditions at the time may be more favourable.

(xxxiv) Allowances granted in lieu of provision in kind will continue to be reviewed periodically, though minor changes in conditions will not be reflected in an alteration of the rates.

(xxxv) There will be no provision for the regular revision of retired pay.

The Sir Walter Preston Scholarships and Research Fellowships

A year ago Messrs. Textile Machinery Makers Ltd. announced the details of a scheme involving, in the first instance, the expenditure of a sum of £5,000 a year over a period of seven years, on scholarships and research fellowships. The object of the scheme is to provide facilities to enable young men and women to obtain the highest possible qualifications in textile technology, and to give them opportunities for research work in that field and eventually to increase the number of such persons employed in the textile and textile machinery manufacturing industries.

The scheme is administered and awards are made annually by a Board of Trustees appointed by Textile Machinery Makers Ltd., assisted by the advice of Principals of the University Departments in which the recipients of awards will pursue their studies.

Undergraduate Scholarships are divided into three groups:

Group I awards are entirely restricted to works apprentices and other young persons in the employ of the constituent companies of Textile Machinery Makers Ltd. who have obtained the Higher National Certificate in Mechanical Engineering, Electrical Engineering or Metallurgy.

Group II awards are for works apprentices or other young persons in the employ of the constituent companies of Textile Machinery Makers Ltd. who have obtained the ordinary National Certificate in Textiles, or an equivalent subject, and who are judged to be capable of proceeding ultimately to a Bachelor's Degree with Honours. Applications may be considered, under this group, from young persons who have the above qualifications, but who are not in the employ of the constituent companies of Textile Machinery Makers Ltd.

Group III awards are for students leaving secondary schools who hold the High School Certificate or such other qualifications as will admit them to a higher course leading to the Bachelor's Degree with Honours.

The value of the awards which are tenable at the University of Manchester, in the Faculty of Technology, is:

Group I ... \$\frac{1\text{st Year}}{\pmu200} \frac{2\text{nd Year}}{\pmu200} \frac{3\text{rd Year}}{\pmu300} \frac{4\text{th Year}}{\pmu300} \frac{5\text{th Year}}{\pmu} \frac{5\text{th Year

Post-graduate Scholarships (Group IV), valued at £300 to £350 a year, are also offered to Honours Graduates in Science or Engineering, in order to attract into the textile industry or the textile machinery industry some of those who would otherwise make their careers in other branches of industrial activity. The normal tenure of a Post-graduate Scholarship would be three years to enable the holder to obtain a second qualification in Textile Technology and to follow it by a year's research leading to the Master's Degree.

Research Fellowships valued at £400 to £550 a year are awarded to graduates selected from scholarship holders in Groups I to IV, or to candidates from other universities who have obtained an appropriate Honours Degree. The tenure of the Research Fellowships would be from two to four years.

The Trustees under the Scholarship Scheme announce that Undergraduate and Post-graduate Scholarships and Research Fellowships are available in all award groups. Applications for Undergraduate Scholarships must be forwarded not later than 8th June, 1946, and for Post-graduate Scholarships and Research Fellowships not later than 12th July, 1946, to The Secretary, The Sir Walter Preston Scholarships and Research Fellowships, c/o Messrs. Textile Machinery Makers Ltd., 60 Huddersfield Road, Oldham, Lancs, from whom application forms and full details may be obtained.

Delayed Fright

By T. C. W.

"JUST think what might have happened!"
Many times one has heard that exclamation at the end of a story recounting how someone has had a very narrow escape without being aware of his danger till some subsequent discovery suddenly made him realize the situation he had survived. On some occasions such discovery has been known to cause the individual concerned to "pass out" completely, and it has never failed to cause amusement to those who watch the sudden dawning of realization.

The following two incidents come in this category. One of them is a personal experience and the other "borrowed." It is hoped that no offence is caused to anyone by putting it on paper. It is a good story which has often been told but never, as far as is known, recorded. Let's have it first.

At one of the more remote Royal Air Force stations there was a tame lion cub. This cub had been on the station for some considerable time, was about half-grown at the time of this story, was very friendly with everyone and was given the run of the camp and landing ground. The only exception to this rule was that he had to be shut up at night, as on one occasion he had obstructed the flare path when night flying was on. It was supposed to be the duty of the Orderly Officer to shut him up.

One night when night flying was in progress a half-grown lion appeared on the flare path. O.C. Night Flying went off the deep end, cursing everyone in general, and the Orderly Officer in particular, for not shutting the lion up. He and the others on duty on the flare path threw stones at the animal, but he took no notice. Furthermore, he seemed only mildly interested when a couple of red signal cartridges were loosed off in his direction. At last, in sheer desperation O.C. Night Flying announced that the brute was used to all these things and that the normal way of ridding ourself of his presence was to kick him gently but firmly on the back-end. Suiting his action to his words, he set off up the flare path, took a run, and administered to the lion the normal indication that his presence was superfluous. The lion looked round rather surprised, and then departed quickly as usual. Night flying proceeded without any further interruption.

On returning to the Mess when flying was

finished for the night, O.C. Night Flying sought out the Orderly Officer and asked him what on earth, etc., he meant by omitting to lock up the lion as usual and threatened all sorts of dire consequences for his negligence.

"But, sir," said the Orderly Officer, "I did lock him up! As a matter of fact, sir, he is still in his

cage."

No version of the story which I have heard has stated what were O.C. Night Flying's subsequent actions or reactions, so I will refrain from inventing them. But he must have been a very shaken man!

We, a very scratch crew, were ferrying a Blenheim from A to B, a journey involving long stretches over the sea and the fitting of long-range tanks. It may be remembered that these consisted of "Wimpey" tanks put in the bomb cell. Their contents had to be transferred to the main tanks by what seemed to be an infinite number of wobbles on a wobble pump. This latter generally leaked when in operation, not badly but enough to cause a strong smell of petrol to permeate the aircraft.

While doing our "wobbling" act at nought feet because of the weather and miles from land because we had to be, I detected through the stink of petrol what I thought was the aroma of tobacco smoke. I could see that the navigator was not the offender and it must therefore have been the air gunner. He was duly contacted on the inter-com. and admitted his guilt. He also carried out very quickly some explicit and highly coloured instructions from the pilot to jettison his cigarette. Being pretty well occupied with other things, I let the matter rest for the time being.

In view of the fact, however, that the gunner's behaviour in the air was normally exemplary. I was prompted to find out what had caused his lapse from grace, so on arrival at our destination the following conversation took place:

"Sergeant ————, what on earth possessed you to light that cigarette without consulting the captain of the aircraft?"

"I'm very sorry, sir; I did it without thinking. I couldn't stand the smell of petrol any longer."

They did not have to carry me away, but my track for the first few yards must have been a bit erratic.

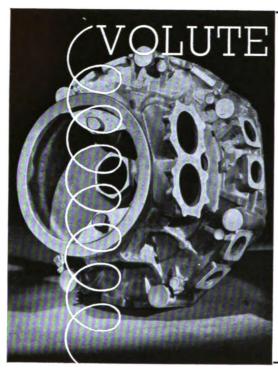
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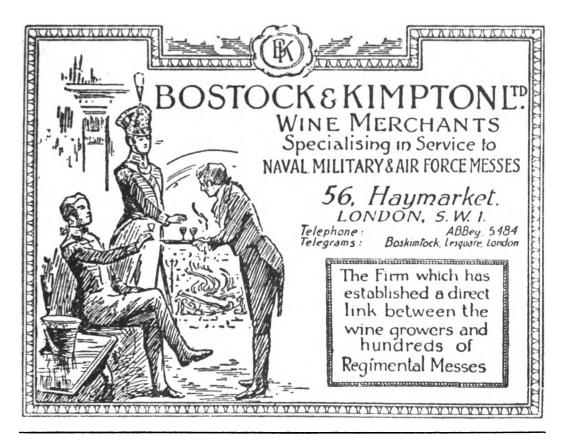
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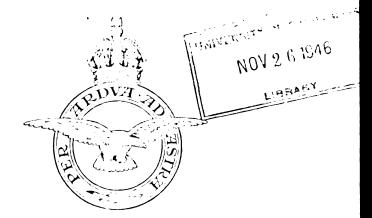
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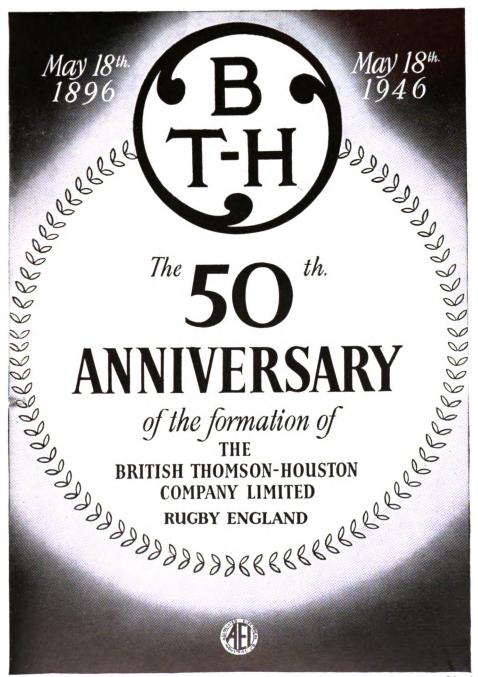
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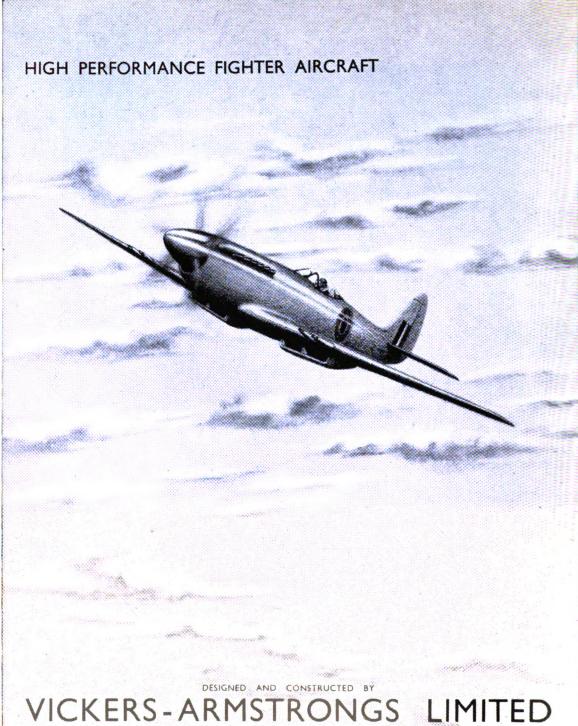
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Assisted by an Advisory Committee of Members of the R.A.F. and Air Forces of the Dominions

VOLUME XVII

SEPTEMBER, 1946

NUMBER 4

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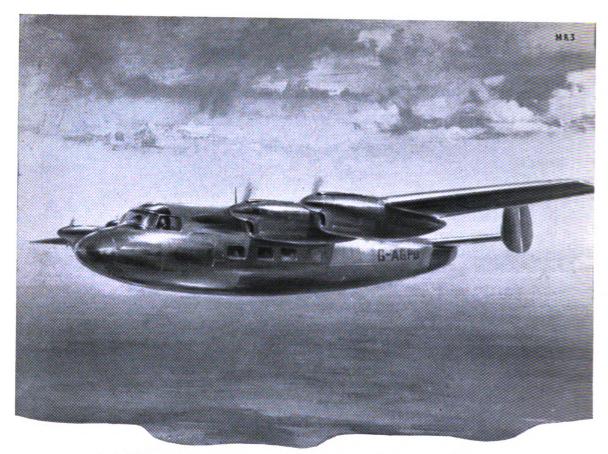
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IN PARLIAMENT

19th June, 1946.

AIRMEN VOLUNTEERS

SIR T. MOORE asked the Under-Secretary of State for Air the number of servicing air officers and men who have volunteered for extended service in the R.A.F. up to date and the number still

required.

MR. DE FREITAS: We have had more applications for Permanent or Extended Service Commissions than there are vacancies to be filled at present, and I think the hon, and gallant Member's Question is mainly concerned with the categories in which we still need volunteers. We need airmen volunteers. Firstly we want serving airmen to stay on for three or four years under the Bounty Scheme recently announced by the Prime Minister; 2,000 have so far applied, and we want another 58,000. Secondly, we are still taking everyone who is suitable and who wishes to enlist for regular service, or to extend his regular service or to re-engage; so far we have had a total of 16,000 from the Air Force and from outside. Finally, we are giving a bigger place in the postwar Air Force to pilots, navigators, signallers, engineers and gunners who are not officers. 4,400 serving aircrew have applied to extend their present service, but we still need many more.

26th June, 1946.

SHORT-SERVICE OFFICERS (Permanent Commissions)

SIR I. FRASER asked the Under-Secretary of State for Air how many officers, who joined the R.A.F. on a short-commission basis, are still in the Service; and how many will be granted permanent commissions.

MR. DE FREITAS: I regret that information regarding the number of short-service officers still in the Royal Air Force is not readily available. We are still selecting officers for permanent commissions, and do not yet know how many more short-service officers will be chosen. So far, 313 of these officers have been granted permanent commissions.

1st July, 1946

ARMED FORCES (STRENGTH AND AWARDS)

In answer to a question put by SIR R. GLYN, the Prime Minister said that the number of men

and women who served in the Armed Forces of the United Kingdom during the period from 3rd September, 1939, to 1st May, 1946, was as follows:

Men				
Royal Nav	/ V			964,000
Army				3,927,000
R.A.F.	•••	•••	•••	1,274,000
Total	•••			6,165,000
Women				
· W.R.N.S.				89,000
A.T.S.				315,000
W.A.A.F.				223,000
Nursing Se	ervices	• • • •	•••	29,000
Total				656,000

The approximate total numbers of awards made, other than Mentions in Despatches and King's Commendations, from the beginning of the war to 1st May, 1946, in the Navy, Army and Air Force respectively, were 22,000, 53,500 and 39,000, including Dominion, India, Burma and Colonial Forces.

31st July, 1946

PERMANENT COMMISSIONS

MR. DAVID RENTON asked the Under-Secretary of State for Air how many applications for permanent commissions are awaiting decision by his Department; and when it is proposed to announce the results of these applications.

MR. DE FREITAS: Since March, 1944, about 26,000 officers altogether have applied for permanent or extended-service commissions. Some 5,500 have not yet received a reply to their application. We are issuing frequent selection lists and I hope that before the end of the year everyone will know what has been decided.

MR. RENTON: While appreciating that the hon. Gentleman's Department has a considerable task in this matter, may I ask him to bear in mind that many of these young men are due for demobilization very shortly, and that it would help them to plan their future careers if they could be given an answer about this as soon as possible?

MR. DE FREITAS: I understand that. Of course, all these applications have to be examined carefully, in justice both to the men and to the taxpayers. We can afford only the best.

AIR COMMODORE HARVEY: Is the hon. Gentle-



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6H, 91

man aware that some of these officers filled in application forms for permanent commissions some three years ago, and have not yet been told whether or not they are to be given permanent commissions? Will the hon. Gentleman do something about this quickly?

MR. DE FREITAS: I understand that the scheme did not start until March, 1944, but if there are any which have been long outstanding and the hon. and gallant Gentleman will give me examples of them, I will look into them.

RESERVES

AIR COMMODORE HARVEY asked the Under-Secretary of State for Air what progress has been made with the formation of the Reserve of Air Force Officers and the R.A.F. Volunteer Reserve; and when applicants will be accepted for service.

MR. DE FREITAS: I am afraid there is little I

can yet add to the answers given by my predecessor on 27th March and 1st May. The hon. and gallant Member will realize that much has to be done on the accommodation side alone before a real start can be made with training and that it is bad policy to recruit men before we have training facilities. I can, however, assure him that everything will be done to re-form the reserves and to provide training as soon as we can.

AIR COMMODORE HARVEY: While I appreciate the Minister's difficulties, may I ask if he is aware that many of these ex-N.C.Os. and officer-pilots have been out of the Service for over a year and are rapidly getting out of flying training, so that unless steps are taken at an early date to train them the cost to the Government will be much more and they will not get the material. Will he look into the matter?

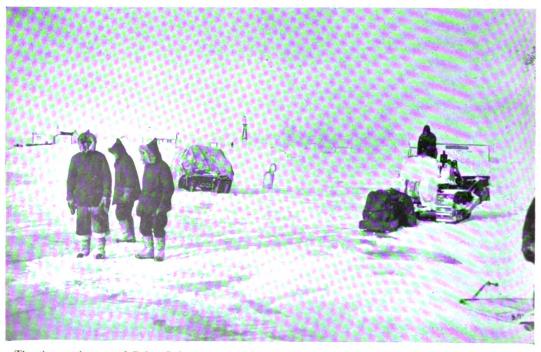
MR. DE FREITAS: Yes, Sir.



Testing a 600 m.p.h. jet engine. (See page 239)



A "Norseman" preparing to take off



The tiny settlement of Baker Lake was a supply base for Moving Force. The landing strip is shown under construction.

X ii

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British United Aid to China Fund

British United Aid to China has received a cheque for £25 through Air Commodore A. D. Rogers, C.B.E., A.F.C., from the personnel under his command at Air Head-quarters, Royal Air Force, Gibraltar. Lady Cripps, President of the Fund, warmly thanks all those who helped to achieve this splendid sum.

Despatches from China still stress the urgent need for financial help to enable the Chinese to combat disease, privation and personal distress throughout the country.

The officers and airmen of the R.A.F. Station, Dunmurry, Northern Ireland, have sent £70 to British United Aid to China, and the sums of £16 6s. 6d. from 904 Wing, R.A.F., Netherland East Indies; £6 10s. from Wyton Station, Hunts; and £6 1s. 6d. from Ellers Road Station, Doncaster, have also been received. Lady Cripps, President of the Fund, wishes the commanding officers of these commands to express her sincere thanks to all personnel under their command. The gift is being sent to alleviate the widespread famine which has stricken the Hunan Province.

R.A.F. Quarterly and Empire Air Forces Journal

ESSAY COMPETITION, 1946-47

The subject and conditions of the next competition are published on page xviii. Prizes to the total value of £120 are offered.

NEW FEATURES

When more paper becomes available the extra space provided thereby will be devoted to articles on Service Life and Experiences, and to articles and verse of a humorous character. In the meantime, we shall devote some of the existing space to articles of this nature and we shall be pleased to receive contributions from now on. The fees offered for such contributions will be on the same scale as those dealing with professional subjects.

PHOTOGRAPHS, AND PEN AND PENCIL SKETCHES

Any number of these will be most welcome at all times; especially those depicting Service life at home and overseas. Humorous and other sketches, either as illustrations to articles and verse or separately, are particularly required. All contributions may be sent direct to the Editor:

Wing Commander C. G. Burge, c/o Gale & Polden Ltd., Ideal House, Argyll Street, Oxford Circus, London, W.1.

Photographs and sketches should have the name and address of the sender written on the back of each, and should be well packed between stiff paper or cardboard.

A minimum fee of half a guinea is offered for each photograph or sketch reproduced; rising to two guineas for whole-page reproductions of sketches.



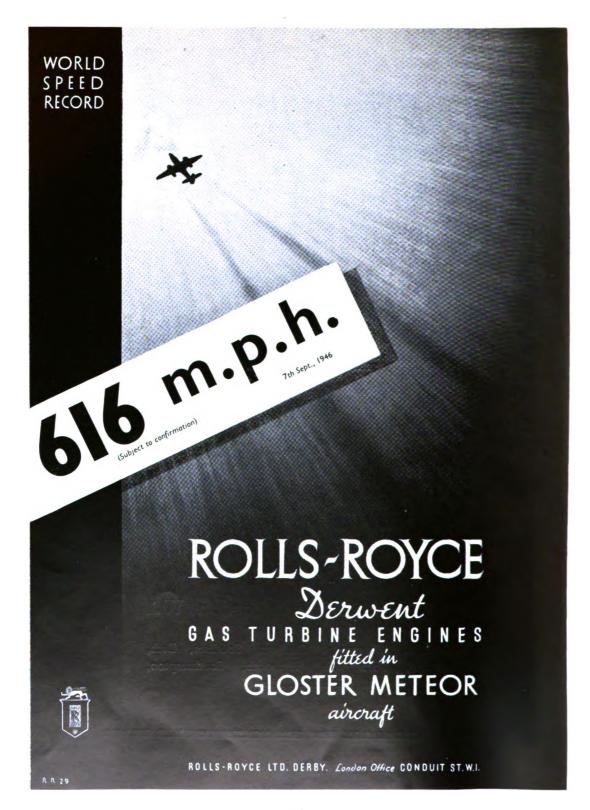
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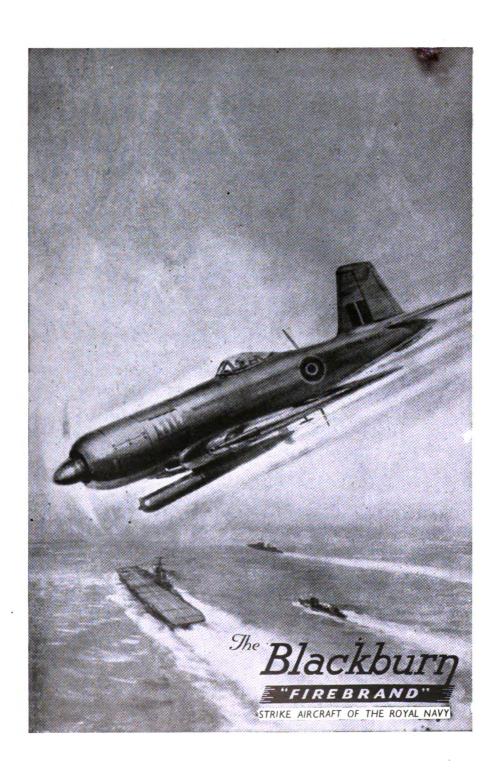


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THE ROYAL AIR FORCE QUARTERLY EMPIRE AIR FORCES JOURNAL

ESSAY COMPETITION 1946/7

- 1. SUBJECT: "AIR SUPERIORITY AND AIR SUPPORT."—Discuss Air Support in terms of Air Superiority and the influence of the one upon the other. (N.B.—Both Naval and Land Operations are included in the subject for discussion.)
- 2. THE COMPETITION is open to Members of all the Military (Naval, Land AND AIR) FORCES OF THE BRITISH COMMONWEALTH AND EMPIRE.
 - 3. CLOSING DATE FOR COMPETITION: 30th April, 1947.
 - 4. Essays are not to exceed 10,000 words.
 - 5. The following PRIZES are offered and guaranteed by the EDITOR personally:

2nd Prize £30 3rd Prize £20 1st Prize £50

PRIZES OF BOOKS UP TO THE VALUE OF an additional £20 will be awarded for other Essays which in the opinion of the Adjudicating Committee are deserving of an award.

A Grand Total of £120

For further details of this Competition, see the DECEMBER, 1946, NUMBER of this Journal.

BENEVOLENT FUNDS

Contributions to the Benevolent Funds of the Commonwealth and Empire Air Forces. Amounts contributed: June, 1946, Quarter

The Journal's donation					21	5	0
					£21	5	0
This sum has been allotted as follows:							
To R.A.F. Benevolent Fund		£10	5	0			
To R.C.A.F. Benevolent Fund		4	0	0			
To R.A.A.F. Benevolent Fund		3	0	0			
To R.N.Z.A.F. Benevolent Fund		2	0	0			
To S.A.A.F. Benevolent Fund		2	0	0			
					21	5	0
Brought forward	•••	•••			747	14	0
Grand total contributed to da	ate				£768	19	0

£ s. d.

A Letter from Singapore

REDUNDANT AIRCREW

To the Editor of "The Royal Air Force Quarterly"

Sir.

Soon my ex-aircrew staff of clerks will be leaving; returning to the United Kingdom for release. Hard things have been said of aircrew and particularly those made redundant since the end of the war; they were a waste of public funds, big money for little work; as senior N.C.Os. and warrant officers filling establishments of A.Cs. they made invidious the job of the tradesman N.C.O., particularly the Corporal newly acquiring the art of leadership, supervision and man management.

How soon it is forgotten that aircrew, in their finest hour, saved the world from defeat by the black forces of aggression and tyranny, and by their efforts and courage in the strategic bombing operations, the Tactical Air Forces and Coastal Command gave us victory!

I know aircrew who did no "ops," because of the victory in Europe and Japan, who, had the war been prolonged, would have been as worthy of their brevets as those who had gone before, and would assuredly have added more laurels to enhance the triumphant traditions of the Royal Air Force.

After arduous training they have had the galling experience of being employed as aircraftmen in ground trades often not to their liking, and often feeling that they were unwelcome in their sections, and criticized in their messes.

During the past six months I have been glad to have ex-aircrew working with me and have been impressed by their keenness and hard work. Their exuberance and good humour combined with discipline and willingness to take orders from N.C.Os. of the same or lower rank have made hard routine jobs easier to perform. They have filled the gap created by lack of trained staff and eased the burden of urgent manning problems.

I have known aircrew in England and Scotland, in winter quarters in Holland and on airstrip in Germany as 2nd T.A.F. supported the magnificent Second Army in its triumphant march of liberation through Europe. On 1st July, 1945, the victorious squadrons gave a magnificent display of aerobatics over beautiful Copenhagen and showed the happy, grateful Danes the power of Britain's armed forces. Spitfires and Mosquitoes, Typhoons and Tempests vied with the new Meteors in demonstration of flying skill.

As one of the happy band of ground staff I have always admired with respect the aircrew and enjoyed their comradeship. We have drunk brandy together in Belgium and Holland, Hock in Germany and schnapps in Denmark, and I hope soon we will be having a tankard of good old English beer in a country pub when we have finished our tour in South-East Asia.

I am, sir,

Yours faithfully,

NORMAN HEWITT,

Warrant Officer, R.A.F.

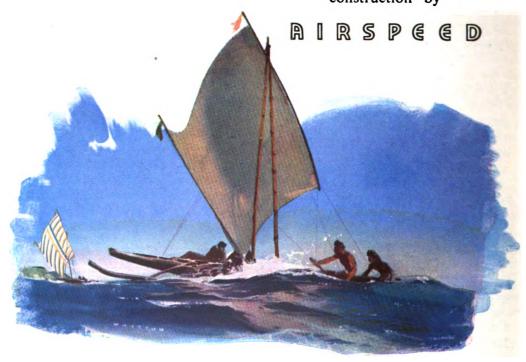
Singapore, July, 1946.

PS.—The rehabilitation of aircrew is an urgent job calling for energetic action. The R.A.F. Association and R.A.F. Benevolent Fund can help to foster the comradeship of the air.



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EDITORIAL

International Matters of Moment

THE PEACE CONFERENCE.—As we write, the representatives of twenty-one nations, all more or less actively engaged in the late war, are assembling in Paris for the first of the full-dress Peace Conferences.

The ground has been thoroughly turned over, and to a certain extent prepared, by the Foreign Ministers of the four Great Powers, meeting also in Paris during June and July. Difficulties they met in plenty, and there were times when agreement seemed impossible and their conference threatened to come to an end without a decision on any major question. What that would have meant for the future of peace in Europe and in the World, we cannot imagine. Let us, instead, congratulate ourselves and the four Foreign Ministers that sufficient agreement has been reached to make the calling of the full Peace Conference practicable.

Retrospective consideration of the issues that came up at the preliminary conferences of the Foreign Ministers, and of the reactions of the individual ministers to them, reveals several important facts. First, although it appeared that Russia had all along been the difficult one to please, it is very apparent that all the four ministers were at one in a sincere desire to secure the peace of the world for as long as it might be possible. The difficulties were caused not by divergencies of aim but by differences of opinion on the way in which that aim could best be achieved.

There was also revealed a tendency for the two Western European Powers and America to make common cause—not against Russia but in their own interests for mutual co-operation. We have previously, in sympathy with Lord Vansittart and Mr. Churchill, advocated a strong entente or alliance between the Western European Powers and America, within the framework of the United Nations Organization, as a necessary solid bulwark of international peace; and we see no reason why Russia, or any other nation, need fear it or object to it. Russia, it has been repeatedly pointed out, has provided herself with a strong body of support in Eastern Europe, and if such a policy is desirable and permissible in Eastern Europe, it is surely equally so in Western Europe. Russia has the advantage of dictatorial powers over her "allies" in the East, but any alliance of Western European Powers would have to be by mutual consent, hence the

need for specific agreements as soon as possible.

No major decision, it appears, was taken about the future treatment of Germany, and very little progress was made in regard to Austria. Germany having been the principal aggressor in both World Wars, it is essential that some satisfactory policy acceptable to all parties (i.e., all parties on the victorious side, at least) shall be adopted. It is axiomatic that the power to repeat what she has twice tried to do, and very nearly succeeded in doing, must be denied to Germany. But it is equally obvious that she must be so constituted and established as to be economically self-supporting and capable of maintaining her people at a reasonable standard of health and comfort. Whether Germany be reconstituted as one economic and political unit, or whether she be split up into two or more separate States, federated or independent; the same principles must be applied. Otherwise it is certain that she would become a hot-bed of intrigue and sedition, in which all the disaffected elements in Europe would find a breeding ground and the peace of the world would again be menaced.

"OPERATION CROSSROADS."—The public has not been told very much about the results of the atomic bomb tests at Bikini. Doubtless a vast mass of scientific data was obtained, which even now the scientists are sorting out and checking, and from which they will in due course deduce something. But it is unlikely that the information so obtained will do much more than confirm the calculations and the forecasts made by the scientists before the dropping of the two bombs, for they appear to be so much the masters of their materials that no new discovery is to be expected.

This is all very satisfactory from the scientific point of view, but it does not make the atomic bomb any less dreadful. It removes the danger of an accidental blowing up of the whole world—if any such danger ever existed, which it did not except in the imaginations of the credulous and the uninformed. But the following facts remain: (i) the atomic bomb is a weapon of immense destructive power and is still in its infancy; (ii) it will certainly be used in any future war (for if the nations could be brought to renounce this form of warfare, which gives the aggressor overwhelming advantage, they could as easily be brought to renounce war altogether); (iii) its secrets, if secrets

there be, cannot long be kept from the world; and (iv) the only defence is reprisal, and reprisals cannot restore the dead to life nor rebuild the cities which will have been destroyed in an hour.

So the only result of the Bikini tests is to confirm what we knew already, that we must either be prepared for future wars to be immensely more destructive or we must find a way to avoid war altogether. There is no third alternative. Meanwhile the public will have gratefully added a new word to the vocabulary of the crossword puzzle. Perhaps it is as well thus lightly to treat the matter; for some things are too dreadful to be contemplated.

"UNESCO."—The United Nations Educational, Scientic and Cultural Organization will hold its first regular session in Paris in November. A Preparatory Commission, sitting in July, has already mapped out an ambitious programme for it:

(i) One of its functions will be to co-ordinate the work of the existing national and international scientific bodies and to co-operate with them, without in any way restricting their freedom, which must be absolute if the study of science is to be pursued to the best advantage. A similar policy will be adopted towards the teaching profession.

(ii) Another function will be the calling of conferences to enable questions of world-wide interest to be discussed on as broad a basis as possible. For example, it is proposed to call a conference next year to discuss at some length the best way in which the factors that determine international relations can be taught, not only in universities and training colleges, but also in primary and secondary schools and even to the general (adult) public. And to help in the interchange of ideas, it is proposed to establish a country home for Unesco where wise, well-informed and experienced men and women of all countries may meet and talk.

(iii) Attempts will also be made to solve the problem of illiteracy, to define and promote "fundamental education" for everybody, to encourage the revision of textbooks in history, geography and civics, to examine the functions of public libraries and of scientific journals, and to define the role of the arts (music, dancing and the pictorial and plastic arts) in general education, etc.

(iv) The Council will also consider how to encourage certain key persons, e.g., civil servants, librarians, bank officials, booksellers and teachers of all grades, to take a sabbatical year of foreign travel for the broadening of

their minds and the increase of their knowledge.

(v) It is proposed to establish an Information Centre for the clearing of applications for information of all kinds by directing them to the quarter most likely to supply the answers; and to establish a sort of International Central Library.

(vi) Lastly, the Council will interest itself in providing assistance to countries devastated by war; in setting up in Paris a "Study Centre in International Relations"; and in establishing, for outstanding young teachers from all countries, a summer course where they would meet experienced educators in international affairs and exchange ideas with them and with each other.

If this seems a very ambitious programme, we can but hope that a very great part of it will be accomplished. Such peaceful penetration in the realm of ideas can do nothing but good. The Constitution of Unesco recognizes that "wars begin in the minds of men" and that therefore "it is in the minds of men that the defences of peace must be constructed." So it may well be that Unesco may become the most effective organ of the United Nations Organization for the preservation of peace.

INDIA AND THE MIDDLE EAST. (a) India.—
His Majesty's Government have adopted a courageous and statesmanlike policy in offering India complete and absolute freedom, both to govern herself and to choose whether she will remain a member of the British Imperial Commonwealth or not.

For sentimental reasons, many may regret this step. India has for so long been an integral part of the Empire—an empire within an empire. She has commanded the services of many of the best of Britain's sons in her armies and in her civil services. She has been the scene of countless battles in which British and Indian soldiers have fought side by side with equal gallantry. Her own contributions to Britain's wars outside of India itself, in men, material and money, have been beyond praise. And in the peaceful day-to-day life of this vast sub-continent with its teeming population, British and Indians have worked together, both in British India and the Indian States, in the administration of justice, in all forms of engineering, in irrigation and afforestation, in famine relief, in finance, in industry and agriculture, and in every activity that has contributed to the wealth and prosperity of the country. This partnership has produced, among those who have had the privilege of taking part in it, a comradeship of mutual admiration and respect of which the memory will never die. If we of the British race may claim to have taught the Indians how to govern and administer their country, we must also admit, as we freely and gladly do, that the Indians have been apt pupils. We may look back over the three and a half centuries, during which we have had an ever-growing interest in India, with some pride in our achievement; and our work has been brought to such a pitch of perfection that now we not only can but must hand over the whole peninsula to its proper custodians, the Indians themselves. Finis coronat opus!

What the immediate future has in store, it is as idle as it is impossible to guess. We have made an act of faith. Both parties have made an act of faith. And faith is a far more powerful force than your materialists and your cynics are prepared to admit. India, embarking on this new venture, may be well assured that she has the good wishes of her former tutor and guardian; and she knows that she can still obtain advice and help from us if she wants it. We believe that the Indians will make a great success of governing India. And to give them the opportunity of proving this, it was necessary to take the step which has been taken a step which is in perfect harmony with British colonial policy since 1918. We shall watch with more than usual interest the development of this our latest daughter nation, and we shall not be surprised if she rivals her elder sisters, Canada, Australia, New Zealand and South Africa, in statesmanship, in wealth, in power and in loyalty. And so, whether within or without the Imperial Commonwealth, India will ever be as dear to the heart of Britain as any of her other grown-up children.

(b) Egypt.—The withdrawal from Egypt has aroused considerable hostility among the critics of the present government. It was condemned as bad policy on various grounds, e.g., it would leave the Suez Canal open to attack and the Sudan at the mercy of Egypt; it was a sign of weakness on our part; it was a betrayal of the fellaheen, whose interests we had so long protected; and it was done at the wrong moment, i.e., before negotiating for a treaty.

Doubtless there is something to be said for each and all of these objections. But we cannot, if we are to be consistent in our policy, insist upon keeping our armies in a friendly foreign country when there is no war on; and the presence of British troops on Egyptian soil, except by invitation, makes it very hard for the Egyptian rulers of Egypt to realize, and still more difficult for them to convince the

Egyptian people, that they really are masters in their own house. References to the reactions in the Egyptian press which, we are told, immediately became even more hostile to Britain, are really of little value. The devil can cite scripture for his own ends, and any politician can quote the newspapers to prove whatever case he may momentarily wish to prove. The matter goes deeper than the ephemeral ebullience of popular journalism. There is a principle at stake. We have long stood for selfdetermination and non-interference with the internal affairs of other states, and we have just fought a second war in defence of freedom and for the independence of small nations. How then can we consistently prolong a state of affairs in Egypt that denies to Egyptians those very things for which we stand and for which we have fought two great wars.

We do not suggest that the decision to evacuate Egypt was a wise one from the strategic point of view. But we do say that moral principles are above strategy and that Egypt's right of independence, uncompromised by the presence of British troops on Egyptian soil, must now be conceded in fact as well as in theory. That, we believe, is the principle upon which His Majesty's Government has acted.

This does not necessarily mean leaving Egypt defenceless and the Suez Canal exposed, except in so far as Alexandria and Cairo and other big centres of population could be reduced to ruins by an unexpected attack with atomic bombs and the Canal effectively destroyed by the same means. Apart from this danger, from which even the presence of British troops in Egypt could not guarantee immunity, the defence of Egypt and the Suez Canal by sea, land and air will certainly be arranged. It will be a joint defence by British and Egyptian forces, and the plans for it will be prepared by the naval, general and air staffs concerned. But the most important consideration at the moment is that this essential co-operation will be all the more cordial and effective arranged between two independent partner States than it would be if imposed by us upon an unwilling partner nursing a grievance. If and when we enter Egypt again after the present evacuation is completed, we shall enter as invited and honoured guests.

(c) Palestine.—The problem of Palestine is again prominent, owing to the publication of the Report of the Anglo-American Commission and to the recent outbreak of lawlessness and violence. It is a sad story and the last chapter is not yet in sight. We would not knowingly say

anything that would make the task of the peacemakers more difficult or postpone the final settlement. But one thing is certain and that is that a settlement of some sort must be achieved soon, or conditions will go from bad to worse. The longer a settlement is postponed, the more difficult it will become.

His Majesty's Government are faced with a problem that is none of their making. Our pledges to the Jews and our pledges to the Arabs appear to conflict. They cannot be carried out in full because they are mutually irreconcilable. And the matter has gone on so long that both parties to the dispute have become intransigent; and each is insisting on things which he knows the other will not concede. The problem may well appear insoluble and defy the best brains and the most astute diplomatists. Yet a solution must be found

and that quickly.

The recommendations of the Peel Commission (1937), after having been pigeon-holed for some years, are again being examined and advocated by well-informed men. Partition, they say, if not the only solution or even the best solution, is a solution worth trying. And the lines of partition, as drawn by the Peel Commission, could be modified with advantage. This solution would at least have the merit of keeping the Jews and the Arabs in separate states or provinces, except in Jerusalem where some sort of con-dominium could be established and the Peace of God maintained for the sake of the Holy Places sacred to Jews and Arabs and Christians. For it does appear that, in present circumstances, Jews and Arabs cannot live peacefully in the same State. If partition be the adopted solution—and we can see no other that holds out any comparable hope of successit will have to be by the consent of both parties; and that, in their present state of intransigence, may seem unlikely.

Yet we believe that the trouble is being fomented on both sides by certain interested persons; though for what ultimate reason we cannot hazard a guess. We have met both Jews and Arabs, in Palestine itself, who had no quarrel with the other and desired only to live in peace and tranquillity side by side; and we believe that the vast majority of both parties would be quite content if they were not stirred up by agitators. How then can we put a stop to agitation? By removing the causes. Let both sides be persuaded, as they must be, that neither can have all they ask for; offer them partition as a means of getting most of what they want; and let two States be set up, an Arab State and a Jewish State, each independent of the other but temporarily under the trusteeship of Great Britain until such time as they can stand alone.

We had just written the foregoing when the news arrived that His Majesty's Government proposed partition, on a federal basis, and intended to call a Round-Table Conference to try to secure the agreement of all parties. The first reactions among Jews and Arabs were not very promising. But no doubt there had to be some "saving of face"; and it seems reasonable to expect that, in the calmer atmosphere of the conference chamber, the two opposed parties, recognizing that neither can have all they want, will come to agreement. Otherwise the present very unsatisfactory situation must be prolonged; and nobody wants that, least of all the British Government.

Sir Reginald Coupland, in a recent article in The Times, wrote: "Ten years ago, the writer had a lively talk with a passionate anti-Jewish patriot in Palestine. Tear us apart,' he said, 'and then we may learn in time to come together again." When disease is far advanced, only drastic surgery can save the patient's life. Perhaps this too is a case for the clean cut. When Lord Durham went to Canada in 1839, he "found two nations warring in the bosom of a single State." The remedy was a modified form of separation, and the result, later on, federation. So may it be with Palestine.

DEVELOPMENT AND DEFENCE OF THE EMPIRE. (a) British Colonial Policy.—In May last there appeared in The Times an interesting article on British Colonial Policy by a well-informed correspondent. He pointed out that, in most of our colonies, there is now "an educated section of society which has absorbed many of our democratic ideals and is hungry for greater political responsibility;" but that "no progress in social and political growth can be permanent until the extreme poverty of most of the people has been alleviated."

So economic development must precede and lead political development. This is very true. A comparative study of the political and economic history of our own country reveals, in a most striking way, how political changes have been the outcome of economic changes. That does not necessarily mean that the two go hand in hand. A State may be economically advanced and politically backward, as Germany has been for a hundred years. But it does mean that every form of government more advanced than the most primitive requires certain favourable economic and social conditions without which it simply cannot be maintained. And a democratic form of government, we may add, demands certain favourable psychological or temperamental qualities in the people, otherwise it will not work; as we have seen during the past fifty years when

attempts have been made to impose democratic constitutions on nations wholly unable to support them though quite advanced economically. We refer to the Weimar Constitution in Germany and to Italy before Mussolini and the Fascist regime.

There is no doubt that mistakes have been made in our Crown Colonies and Protectorates by pressing on too fast with democratization. The "educated native," however intelligent, however moral and however well intentioned he may be, has difficulties that his white brother of similar education, intelligence, morals and intentions can neither experience nor imagine. The whole background of the native's life is native, whatever clothes and habits he himself may affect; and the vast majority of his people are still ignorant, superstitious and wedded to their ancient customs and beliefs. It is not surprising then that progress in political development must be painfully slow. It has long been the declared aim of British Colonial Policy so to educate and develop native races that they will ultimately be able to govern themselves; and this policy, loyally applied in all our colonies, leaves nothing to be desired. But in this more than in anything else festina lente must be the motto. We must "make haste slowly." For a too urgent pressing forward inevitably results in a great step back; and the apparent gain of half-a-century may be lost in a week. The policy, we have said, is a good one. There is, perhaps, none better. But it is a very long-term policy and must be applied as such. Development must come step by step; and since the political depends always upon the economic and the social, these two must be attended to first.

Self-determination and self-government have become the catch-words of international politics; and we, with our British idealism, are apt to regard them as panaceas. They are nothing of the kind. We talk glibly and happily of "free elections." But where beside the British Empire and France and the United States do we really find free elections? And what would be the advantage of a free election where the choice lay between rogues or between well-intentioned incompetents? For there are rogues, even among the natives of British colonies, who would gladly exploit their constituents; and a democratic assembly is incompetent to administer a State whose people are too backward to play their parts as citizens of a democracy.

The fault, according to *The Times* correspondent, is traceable to a lack of personal acquaintance in the Colonial Office with circumstances in the colonies. He advises, not that the higher officials of the Colonial Office should themselves spend years in examining things thoroughly on the spot, which would be neither possible nor

desirable; but that a series of comprehensive surveys be made of certain typical colonies, with the special purpose of ascertaining how, and in what circumstances, political progress can be surely made and maintained. We welcome this as a most enlightened proposal; and we do not doubt that it will soon be adopted, if it has not already been adopted. We are sure that these surveys will indicate a need for a considerable slowing-up of the ambitious development that has been attempted in recent years. Patience, infinite patience, is the key. "The counsels, to which Time has not been called, Time will not ratify." Let us not try to make the whole world democratic in a couple of generations. Let us leave something for God and our descendants to do.

(b) The Defence of the Empire.—In the earlier part of this year, meetings of Dominion Prime Ministers and their advisers took place in London to discuss plans for the defence of the Empire. These did not constitute anything like an Imperial Conference. They were informal talks, preliminary and tentative. It was realized that the progress in methods of warfare that has taken place since 1918, and particularly during the war of 1939-45, has radically changed the problem of Imperial Defence. Those responsible are already considering the new situation and devising means to deal with it; and those means will be examined and discussed in great detail at a joint staff conference in due course.

Meanwhile certain principles seem already to be pretty well established. There should be no central organization (at least, not in peace time) for the defence of the Empire; but defence will be organized in zones. It is the policy of dispersal applied on an Empire-wide scale. "It is based on the idea that in every region of the globe all members of the Commonwealth will co-operate in the defence of their common interests in proportion to their proximity and consequent capacity to act with effect; but that in each region the leadership will be exercised by that member which is locally best placed to wield it." (The Times, 16th May, 1946, leading article.)

That is the general idea. And by way of a first step towards applying it, "the scheme put forward by the British Government and based on the advice of the Chiefs of Staff Committee is the creation of a system of combined staffs in the mother country and in the Dominions. This would facilitate the rapid interchange of information and ideas, would enable appreciations on imperial defence as a whole and on individual Dominion defence to be harmonized and interlocked, and would provide a handy form of liaison between the Governments on military affairs." (The Times Military Correspondent).

Machiavelli and the Rockets

By SQUADRON LEADER W. N. KENYON

"We are much beholden to Machiavelli and others, that write about what men do and not what they ought to do."—Francis Bacon.

Since Niccolo Machiavelli published his observations on statesmanship in 1532 the principles of politics have altered little. Countries have grown great and enlightened, but have been destroyed by the machinations of inferior states. Education has advanced among the peoples, but the environment of the educated has not kept pace. Morality is still sacrificed to expediency. Treaties are broken. International politics are still power-politics. Men make wars.

From time to time men have made earnest endeavours to reduce the misery and waste of war. Sometimes rulers with inferior motives have attempted to secure the peace. When Charles VI of Austria wished to ensure the succession of his daughter, he induced nearly all the powers of Europe to recognize her rights. But the treaty did not influence the subsequent actions of a single signatory state, and war was soon widespread after Charles's death. Expediency was justification. The most farreaching endeavour of recent times was the Geneva Convention, at which men tried to confine the practice of war to a set of equitable rules, and thus to maintain a minimum standard of human behaviour. But weapons have been made more terrible than those outlawed by the convention. Prisoners have been executed in thousands. Civil populations have been decimated and enslaved. Concealing their mobilization, aggressor nations have concentrated their forces against their victims' weak points in their own good time, and have struck without declaring war. In short, the Geneva Convention has been set aside. The Locarno and Kellogg Pacts, by which the great powers agreed to renounce war as an instrument of national policy, produced no pause in the practice of armed diplomacy. The most ambitious of all peace-attempts was the effort to prevent the outbreak of war by creating an automatic and overwhelming alliance against an aggressor. But at the same time nations retained their sovereign powers and the League of Nations failed.

Like Machiavelli and Francis Bacon, the soldier must consider what men do, not what they ought to do. He must consider the world as if the possibilities of war were as great as ever; a world in which an aggressor will take full advantage of surprise and attack without warning; and in which expediency may direct the attack against cities and population instead of against armies and war industries. In the forefront of his consideration, the implications of certain new weapons with immense potentialities for destruction must be examined.

THE NEW WEAPONS

The flying bomb and the V2 rocket have left a vivid impression on the people of Great Britain. Although pilotless aircraft have occupied technicians' activities for many years, the form of the winged projectile with jet propulsion was a new development. Rockets have been used for hundreds of years, but the highly mechanical V2, with its turbines and pumps and gyro-control, was so great an advance on the gunpowder rocket that it must be treated as a new device. The possibilities suggested by these weapons are very great, and it is not easy to separate a consideration of future development from the field of speculation. Fantasy is best avoided by giving our thoughts a factual foundation; let us examine the facts in some detail. What can the present weapons do, and what development can reasonably be expected in, say, fifteen or twenty years from now?

The flying bomb used in the last war was a winged projectile weighing about 4,700 lb. with its fuel. It carried some 1,850 lb. of explosive, which represents a smallish bomb. Most of the bombs directed against the south of England were launched from concrete ramps, but after these sites were bombed or overrun they were launched in small numbers from aircraft standing well off the British coast. They were driven by a simple form of jet motor which gave some 600 h.p., and which drove the rockets at 350 m.p.h. at a height between 1,500 and 3,000 ft. The range was some 150 miles. The jet motors were only one quarter of the weight of reciprocating engines of corresponding power, but they used eight times as much fuel. They had one tremendous advantage over the reciprocating engines for use in an expendable weapon: they were cheap to produce, both in money and man-hours. The flying bombs were held on their course by gyroscopes, and the distance they travelled was logged by a machine in the bomb. When a chosen distance had been flown,



the bombs were automatically put into a dive which drove them into their targets. No precise allowance could be made for wind-effect. and fuel consumption was variable: the weapons were inaccurate. This fast low-flying machine was at first a difficult target for our A.A. guns, whose predictors did not then cater for the rapid change in bearing of the bomb. New predictors, and experience, added to the re-deployment of the defences into a gun zone twenty miles deep, raised the A.A. kills from 17 per cent, to 74 per cent, of bombs passing within range. The bombs presented a difficult target for fighters to locate, especially in bad weather, and though many were shot down, it would have needed only a small increase in the bombs' speed greatly to reduce the effective-ness of the defence. The weapons were not radio controlled, but such control is well within the capacity of modern radio practice. It would not be impossible to make a "built in" variation in height and course, to make A.A. defence much less effective.

The V2 rocket was a much more imaginative weapon. Indeed, it was a remarkable technical achievement. This rocket had a streamlined, bullet shape and was forty-six feet long. It weighed no less than twelve tons, but of this weight the warhead was only 2,000 lb. The weapon was driven by alcohol and liquid oxygen fuels, and the twenty-six tons of thrust they produced shot it sixty miles high into the atmosphere at the top of its flight. The speed was enormous: at most about 3,000 m.p.h., though as it fell through the lower, denser regions, it was slowed down to some 1,500 m.p.h. The rocket's speed generated great frictional heat, and the weapon glowed red. It is known that the heat sometimes caused premature explosions while the rocket was still high in the sky. The early part of the flight was controlled by gyroscopes and radio, but later the rocket was as undeflectable as a shell from a big gun. Any large, flat surface was suitable for launching the weapon, which needed no such permanent ramps as the flying bomb did, and which could be fired with a few lorry-loads of equipment. The range of the rocket was about 220 miles, and to achieve this the fuel was about three-quarters of the total weight. This is a notable figure, for the high proportion of fuel-weight to explosive weight will clearly be a limiting factor in the rocket's development as long as present types of fuel must be used. The rocket was a complex piece of machinery and its construction was costly, both in money and labour. The physical destruction it caused was about the same as that of the flying bomb, but

it usually produced more casualties, for it travelled faster than sound and gave no warning to the victims. There was no direct defence against the weapon, though the places where it was made or stored could be bombed, and the launching sites and equipment could be attacked in the rare cases when they were located. In flight, the rocket was often seen on radar screens, but it travelled so fast, and its destination was so uncertain, that no warning to take shelter could be given.

So much for the weapons as they have already been used. Their weaknesses, when compared with heavy bombers, were short range and inaccuracy. Three characteristics are, however, quite outstanding: the offensive nature of the weapons, their suitability for surprise attack and the difficulty of direct defence, which in the case of the rockets was extreme.

THE NEW WEAPONS IN THE FUTURE

In addition to the practical development of pilotless aircraft and rockets, the last war showed technical advances in certain other directions. These developments were:

- (a) The ability to guide and manœuvre weapons by radio control. This technique is well established.
- (b) The ability of missiles to home on a source of energy. In the last war weapons were in routine production which could home on a source of sound. Although technical problems will be greater in other cases, it may be expected that weapons may home on sources of light, heat or radio energy.
- (c) The ability to stabilize and steer aircraft or missiles in flight gyroscopically, and to direct them relative to the earth's magnetic field. In the past, aircraft have had automatic pilots linked to compasses, successfully to steer them in any chosen direction. Though difficult, it may be possible to link automatic controls to an instrument which not only registers the direction of the earth's field, but also measures the strength of its Z and H components. Such instruments are in common use for other purposes, and if the linkage were to become possible, a weapon might direct itself to any chosen place on the earth within its range.
- (d) The ability to detonate explosive automatically when it is near its target.

 Proximity fuses have been in general use.

(e) The ability to bring a great explosive force against a target for a small cost in weight, size and means of transport: the atom bomb.

The developments in homing or guiding projectiles all indicate the prospect of increased accuracy, and in addition a tremendous explosion affecting a wide area can be touched off at the right moment. The range of the pilotless aircraft may be increased by making it bigger, with increased fuel-load, or by carrying it for much of its journey in a parent aircraft as the Germans did. A rocket capable of flying two thousand miles or more would be both huge and expensive to produce. But many responsible scientists assure us that the range can be increased more economically by releasing a smaller rocket from a parent after the two have gained height together.

An aggressor nation may then be armed in the not-far-distant future with robot offensive weapons of great speed, range and accuracy, each one with an immense capacity for destruction. The ideal Blitzkrieg seems to be a probability, and there is more than a suspicion that populous targets might be knocked out in the first few blows.

A threat of this kind is so portentous that it cannot lightly be accepted. Is the threat real or is it a bogy? Surely such a threat was envisaged before the last war. Writers produced lurid descriptions of cities destroyed and inhabitants slaughtered within a few days of the outbreak of war. Yet it did not happen. On the contrary, casualties seem to be lower as the mechanization of the battle increases. Machine seems to replace man, if we compare the last two wars! No, the rocket and the flying bomb were introduced to the battle only after Germany had suffered sufficient damage to restrict their use to numbers much smaller than had been planned. Yet these few weapons occupied several squadrons of fighters, two thousand balloons, a zone of guns twenty miles deep and cost us 100,000 tons of bombs, 450 aircraft, a million houses damaged or destroyed and thousands of lives; all this in a short period. In fact there is every indication that though military casualties may be smaller, civilian losses may quickly make up the balance and outstrip it, even if the destruction of Hiroshima were not in itself a convincing argument. The problem must be faced: the weapons are potent and the threat is real. What defence can there be against such weapons?

THE PROBLEM OF DEFENCE
The difficulty of direct defence has already

been mentioned with reference to the present form of the weapons. The suggestion of using rocket to attack rocket has been put forward, but science points out that the method depends on adequate warning and is associated with a lot of near misses. It has been possible in the past to take counter-measures against radiodirected weapons and there is good prospect of deluding homing weapons if the precise method being used by the weapon is known. While experience shows that counter-measures have been found for all weapons in time, such measures have necessarily lagged behind the offensive. The destructive power of atomic explosive is so great that an adequate defence must be completely effective in all cases, for if only a few weapons get through they may destroy the victim. Direct defence does not offer any such completeness of security.

After their experiences of the last war, the Russians are believed to be continuing to put their war industries underground. Could any comparable effort be made in England? The Russians are using the growing output of their many peoples to make such defensive preparations, which might otherwise produce a substantial rise in their standard of living. Germany put much industry underground, but only by using slave labour which other countries will probably never possess. To use the people's work in England for a similar purpose would mean a reduction in a standard of living to which they have already become accustomed. It is unlikely that the people would accept conditions in peace time such as they have just fought a war to avoid. Moreover, though industries were made safe, the populated areas could not withstand the new striking power. Partial fortification is not enough. Total fortification is an economic impossibility.

Dispersal seems to offer some measure of safety from the new weapons. Those peoples whose centres and industries are most widely scattered have the strongest natural defence against such things as super-high-explosive rockets. Those countries which depend least on industry for the way of life are least subject to damage in this way. Of the great peoples, China would not be a good target for the robots. Russia has a strong position in these respects, and it would be difficult to attack all parts of Russia from outside her frontiers, even with the robot weapons the future may provide. America is highly industrialized, but her lands are far from her neighbours. Britain is extremely vulnerable to any offensive weapons of a type which cannot be stopped. However, the British Commonwealth is not vulnerable,

if it is regarded as a whole, and if Britain could be treated as a non-essential part of it. It is not difficult to picture a Commonwealth with great economically semi-self-sufficient four areas in Canada, Africa, Australia and India. with the smaller countries as dependent areas. and Britain as a great base in Europe. But it must be remembered that if the Commonwealth areas were to become almost self-sufficient. Britain could not support its present large population, and the process of shaping the Commonwealth to the new pattern would make large migrations necessary. From the point of view of Commonwealth defence, then, dispersal offers some attractions, but the process would be difficult and slow, and dispersal would not defend England, nor would it be a complete defence for any part of the organization.

Any country which is threatened with military power greater than it can withstand alone seeks alliances with other states, so that their combined resources provide a greater threat than the prospective enemy's. If the alliance is large enough, the fact that one member may succumb does not destroy the whole, even if. as in the last war, the defenders are unprepared. For as each component is overwhelmed, the remainder gains time to arm and prepare its resistance. The British Commonwealth constitutes such an alliance for the future. The United Nations Organization drafted at Dumbarton Oaks provides a similar, but larger and more powerful defensive alliance. Both are flexibly designed, so that the potential aggressor need not be specifically defined. However, such defensive systems have never prevented war in the past because the member states have only been partially prepared for war. The systems have only succeeded in gaining time, and an ultimate victory. If the new weapons have not only given the future aggressor the capacity to overwhelm the nearer nations in a short time but also to do irreparable damage to the populations themselves, an alliance of this kind is no longer enough. The future alliance's problem will be to prevent the initial blow. It must not only be organized for ultimate victory; it must be already armed to such a degree that there is no slight prospect of success for a potential peace-breaker. It is to this form of defence that the countries which have much to lose from war are turning their thoughts to-day. How should the peace alliance, be it Commonwealth or United Nations Organization, be armed?

STRATEGY OF THE DEFENCE At one stage of the 1914-18 war a great French soldier was reviewing the situation of his forces. As each factor was examined in turn, the situation appeared more and more gloomy. Everything seemed to be against him, and when finally the whole campaign looked desperate he said: "There is nothing left to do but to attack: I attack."

The power of the new weapons has faced the world with the same desperate situation as once faced the Frenchman. No ordinary defensive mechanism seems to be enough. But if it were plain for the potential peace-breaker to see that, as soon as his attack was made, his own population would receive equally heavy blows from the surviving members of the peace alliance, his attack would surely never be made. The alliance must have its weapons ready if they are to be a deterrent. They must be offensive and the most destructive which are foreseen: the new robot weapons, the rockets and pilotless aircraft themselves.

Ideally, these weapons should be so located and so numerous that whoever the enemy might be, he can be attacked from many sides by peace-members whom he cannot strike simultaneously with his first assault. Bases have long been the mainstay of the Commonwealth in its dependence on sea power. They have formed a chain, each link of which has been supported by neighbouring links. Bases for the new weapons should be situated to threaten the main centres of population of any possible enemy. They must be fortified against bombardment and they must have adequate defence against attempts to capture them. Such bases are the second essential.

Just as it is unthinkable that the present Palestine problem should be solved by the easy method of killing the dissentients, it is surely true that such major weapons as those under discussion could only be used in the most extreme circumstances. Minor military problems must still be solved with minor weapons. Moreover, the possession of weapons with a great offensive capacity does not remove the need for the armed services as we know them to-day. Armies, with a large proportion of air transported troops, will still be required in the future for controlling populations, for attacking enemy bases, and for occupying bombarded territories, if war should occur. Aircraft, with their versatility, would be required in addition to robot weapons. A navy would still be needed for the detailed control of sea routes, as in the past, for seas cannot be controlled solely by the capacity to sink anything upon them with a bomb. The Services, as we know them, though modified to suit changing conditions, are the third requirement for either Empire or International defence. Such indispensable Services will almost certainly form the bulk of the defence system, with rockets and pilotless aircraft as main strategical weapons.

FUTURE AND PRESENT

In considering the new weapons in extranational defence, it has been necessary to think of a future time when these new devices have become an equally powerful but less easily countered weapon than the strategic bomber carrying atomic bombs. Have the future requirements any relationship to present defensive needs?

Consider briefly Commonwealth defence in the immediate future. Spread throughout the component countries are the raw materials and industries by which the peoples live, and with which past wars have been fought. Integrating these countries economically there has been an enormous movement of shipping protected by the sea-power of the navies. In recent years, air-power has threatened to defeat this naval power, and many airmen believe that navies in their present form have ended their useful life. The last war has shown that over great ocean distances, fleets armed with aircraft have been supreme, though the use of atomic explosive near ships seems likely to change this situation. Whatever the positions as to sea power may be, there is no question but that air power must play the major part in Imperial defence, in the control of territories and communications, and directly in land or sea warfare. The main weapon of the air is the strategic bomber, which carries the war into enemy territory, disrupts his means of life and softens his defence before the entry of our troops. But air power needs aircraft in many forms and for many purposes: ocean reconnaissance, fighters, and transports for troops and supplies.

This air power has to defend several zones into which the Commonwealth countries may be grouped. There are the Far East zone, with its forces based mainly on India and Australia; the Middle East, with its indispensable oil supplies, which could be defended by forces based in India and Africa; Great Britain, with only slender communications to the east and west, and Canada, with firm support in the United States. If weapons were not such a heavy drain on the resources of the Commonwealth, each zone might have its own air fleet with aircraft suited in every way to the climate of the region, and crews thoroughly trained in the peculiarities of the zone.

But the cost of garrisoning the Common-wealth completely would be too great. Only small forces can be kept in strategic bases, and the defence of any locality depends on the chain of bases for communication and the mobility of the forces of the defence. Similar considerations of overall economy and of mobile forces apply to a United Nations' defence system.

It may be well that the bases which serve in the next few years may also serve for the new offensive weapons of the future. The advent of the developed rocket does not change the grand strategy of empire defence or collective security. The rockets may gradually replace strategic bomber forces, and if they are cheaper in money and manpower to produce and man, they may allow for the complete garrisoning of bases, making the defence less dependent on mobility. At any rate, there is the prospect of orderly transition from present needs to the requirements of the future.

FUTURE FEARS AND PRESENT HOPES

The conception of a world full of highly destructive armament makes a depressing picture. Many people doubt that the peace provided by the push-button offensive-threat of any group of nations can ever be really secure. For those people there is hope in another direction, too.

At present only three great political groups have the capacity for making major war: America, the British Commonwealth, Russia. Britain and America are tied by common interest and a common frontier on the 69th parallel, the fortification of which it is difficult to imagine. Russia has vast undeveloped lands and a hungry population whose needs should occupy the nation for many years. All three groups have recently been reminded of the cost of war. At the same time the United Nations Organization is about to make a new attempt to provide the system of automatic alliance against an aggressor. Its constitution has endeavoured to make allowance for the motives of the great powers and the fears of the small, and it may make possible the solution of the material and economic problems in which modern war has its origin.

Under the stress of economic development, of war and of improving communications, the human race has tended to form itself into ever larger groups. Tribes, townships, walled cities, counties, countries and federated states. Under the threat of the rocket and pilotless aircraft the process of consolidation may be acceler-

ated. Armament may yet be placed in the hands of an international force. That is what men ought to do.

But meanwhile, soldier, consider what men do.

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Exercise "Musk-Ox"

XERCISE "Musk-Ox" was the name given to a Canadian Army non-tactical, scientific expedition into the Arctic and sub-Arctic regions to study (a) Army-Air Force co-operation in these regions, and (b) the mobility of over-snow vehicles under 1,500 miles of extreme cold, 900 miles of early spring and 700 miles of late spring conditions—a total of 3,100 miles in approximately eighty-one days.

Exercise "Musk-Ox" was directed by the Directorate of Operational Research, N.D.H.Q., and in planning it great assistance was received from the Department of Mines and Resources. the Department of Transport, the Royal Canadian Mounted Police, the National Research Council and the North-West Territories Council. In addition, the Dominion Observatory, the Meteorological Service and the survey branches sent observers to co-operate with the force and assess the civilian and scientific aspects of the exercise.

The time for such an expedition was considered ripe because stocks of cold-weather materials needed for the armed forces for winter warfare were available—clothing, equipment, vehicles and aircraft. Also there were the methods of large-scale air-supply as used in Burma and France, and the new technique of navigation, especially by radar. "Musk-ox" also had the valuable experience gained from three previous winter exercises. The Army and R.C.A.F. were chosen to make the tests because they had the only trained personnel available. Civilian scientists and observers were to check their findings and establish weather stations along the route.

Some idea of the enormity of the task, and of the difficulties and hardships that had to be overcome, will be gained from the story of the exploit, which has now been pieced together from a large number of news flashes put out to the Press in Canada at the time.

An advance party arrived at Churchill on 14th December, 1945, in the teeth of a 40-milesan-hour gale with the temperature under 25 degrees below zero. The party was composed of most of the seven officers and 122 other ranks who were to form the Base Force, under the command of Lieut.-Colonel J. D. Cleghorn. Visibility was given as about 15 feet; drivers were blinded by the swirling snow and repeatedly ran off the road. Vehicles broke down and mechanics had to work in bitter cold to get them going again. It was indeed a foretaste of things to come. The camp, which had formerly been operated by the American Army, was on the edge of the Arctic barren lands, four miles from Churchill. The buildings were equipped with heaters and there were an excellent cookhouse, where all ranks ate the same food, a hospital, wet and dry canteens, a combined chapel and theatre, where five films were shown weekly, a bowling alley, garages with complete facilities for maintenance, and steam baths and showers. The most serious drawback was the lack of water. For a time, every drop had to be carted from Churchill. Later, water for cooking, bathing and drinking was brought to the camp in an old truck from a heated tank more than two miles away. Drinking water had to be boiled, then chilled and carried by hand to the living quarters.

Half a mile from the camp the Base Force constructed an airfield, at which aircraft later arrived daily whenever weather permitted. No. 1 Air Supply Unit of the R.C.A.F. Transport Command was entrusted with the task of supplying the expedition. Five Dakotas, supplemented by single-engined Norsemen on skis, were used and the unit was commanded by Wing Commander J. G. Showler, a veteran bush flyer before the war.

The small party of forty-five men who were to make the actual trip was called the Moving Force, and it reached Churchill on New Year's Eve. They were equipped with Canadian vehicles, christened "snowmobiles," which had been developed two years earlier, when 400 were built for a proposed invasion of Norway. "Musk-ox" had fifteen of these vehicles, from which the armour had been stripped and replaced by a cab to protect the driver and three passengers. In them the expedition hoped to cover those 3,100 miles of snow, ice and mud in eighty-one days, and to bring back some of the still-guarded secrets of the far north. If they were successful, then besides opening up the Arctic they would simplify the advance by land and air into the mining and forest areas of Canada, where climate was less rigorous and the natural resources were as great, or even greater.

PRELIMINARY EXERCISES

January was spent in preparation and training. On 22nd January the Moving Force set out on a three-day training exercise, called "Kelsey" (after the explorer who was the first to come to Churchill in 1689). It was not intended to be more than a shake-down exercise to improve techniques, to gain valuable experience in maintaining course by astro and magnetic compass, and to provide excellent practice in meeting and providing for living conditions in the rigorous Arctic winter. It was also to test communications and supply by air under conditions "Musk-Ox" would meet.

The second training exercise was christened "Iceworm." It was a four-day scheme, using four snowmobiles and sixteen men. Its object was again to give practice in navigation, and also an opportunity to compare pre-cooked foods and fresh rations, and to observe the performance of vehicles when hauling sleds in place of the heavy-tracked trailers which were taken on "Kelsey." Rations and reserve fuel carried on the sleds were supplemented by airdropped supplies, and practice in night operations was obtained. Every type of terrain was encountered, including towering ridges of pressure ice and glacial boulders every bit as forbidding as concrete "dragon's-teeth" tank traps.

It was found, naturally enough, that the Monopak Arctic Ration did not fill a man as did fresh rations. Food prepared at base, frozen

and then air-dropped to the force was much more popular. Credit for the idea goes to Capt. Frank Riddell, a signals officer on the Moving Force, who had spent much of the past twenty years within the Canadian North-West. Riddell's beans had more fat and much more meat than usual and were easily thawed out. His doughnuts were thawed out by suspending them on a shoelace from the tent pole so that they caught the heat of the little cooker!

The third exercise left Churchill on 5th February and provided an excellent experience in salvaging a snowmobile that became hopelessly bogged down in freezing slush ice. It was a long and heart-breaking task under almost impossible conditions at temperatures of 30 degrees below zero, but success crowned the efforts.

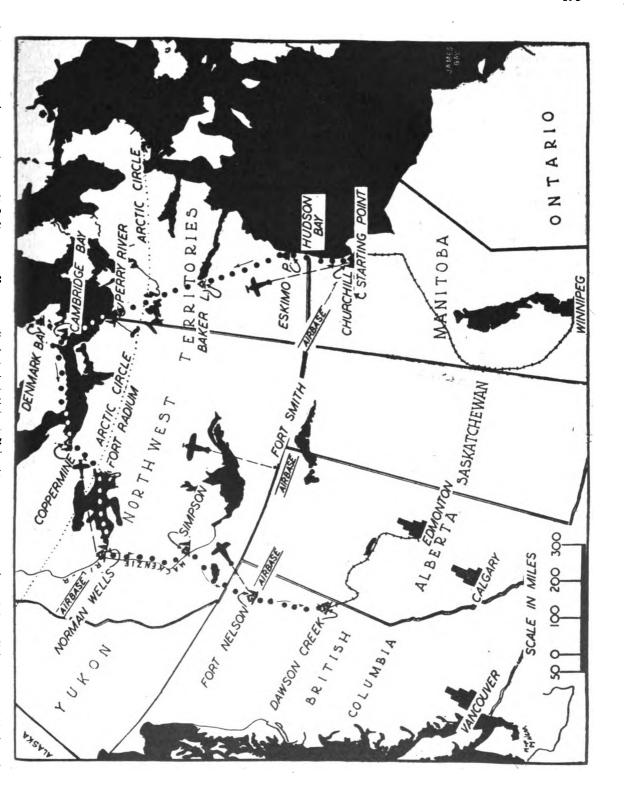
With these preliminary training exercises behind it, the Moving Force felt confident of success, and was all ready for its scheduled departure on 14th February.

THE BAKER LAKE FORCE

Meanwhile, a small party had been despatched to Baker Lake, where it eventually arrived on 18th February. It had the dual task of establishing a weather station, and of clearing and maintaining a landing strip as an advanced refuelling base for wheeled aircraft (Dakotas). From this strip, air cover would be granted to the Moving Force as far north as Cambridge Bay, itself the most northerly point of the trek. Besides meteorological information the weather station was to despatch magnetic information to Churchill to aid the R.C.A.F. aircraft.

The Baker Lake Force, of some eleven men, was commanded by Lieut.-Colonel Graham W. Rowley, of London, England, and of the Directorate of Operational Research in Ottawa. It travelled in two snowmobiles, and took with it two tractors hauling a caboose and three sledges loaded with provisions and fuel. The caboose was used as a combination of cookhouse, machine shop and living quarters, and was large enough to accommodate six comfortably. As no wood grows in the bare feature-less country traversed, even coal had to be taken to fire the stove.

Lieut.-Colonel Rowley was well qualified for the job, for he was an experienced Arctic traveller and explorer. He was in the north when he heard of the war and, although an Englishman, shipped to Quebec on the annual mission boat and enlisted in the Canadian Army. After service in France, Belgium and Holland he was recalled to Canada for work in connection with "Musk-Ox."



The settlement of Baker Lake is 480 miles north of Churchill. It comprised a Royal Canadian Mounted Police detachment, a Hudson Bay Trading Post, Church of England and Roman Catholic missions, and a private, commercial radio station. A glance at the accompanying photographs taken there is ample evidence for the Canadian caption that "Baker Lake was no metropolis!"

It was proposed to keep a portion of the force there through the summer to continue weather reports and make vehicle trials after the snow had gone. They were to be evacuated by sea. The landing strip was also to be maintained by the Army for so long as it was needed for exercise purposes.

THE ROUTE TO BE FOLLOWED

The route to be followed is shown in the accompanying map. From Churchill it led northwards to Baker Lake, thence on over 400 miles of unmapped country—unmapped except for Back River which was discovered and surveyed in 1834 by Capt. Back of the Royal Navy. There had been only one recorded journey down it since that year.

Farther on was Perry River, where an Eskimo operates the lonely Hudson's Bay Post. From there to Cambridge Bay was fifty miles of open ocean ice. A nine-day halt was planned here, whilst a detachment made its way north again to Denmark Bay to take magnetic observations close to the magnetic pole. Also during this pause the Base Force was to leave Churchill for Yellowknife and Norman Wells, to be in closer contact with the expedition in the second half of its journey.

From Cambridge Bay, the Moving Force was to continue across 200 miles of the normally smooth ocean ice to Coppermine, then to strike inland where it would see the first trees since leaving Churchill. At Great Bear Lake, a visit to the uranium mines at Fort Radium was included.

Spring and the break-up would be approaching by then with the warmth and nearly continuous daylight, and the country would no longer be uninhabited or untravelled. The route continued over the ice of Great Bear Lake to Norman Wells, then up the Mackenzie River, past Fort Simpson to Fort Nelson over a tractor trail left from the building of the "Canol" pipe line. Mud and slush would now impede the vehicles, but they should cross the main Mackenzie and Laird Rivers before break-up and reach the Alcan Highway at Fort Nelson late in April. The last 700 miles would be down the highway to Edmonton by 5th May.

THE EXERCISE BEGINS

"Musk-Ox" itself began on 15th February, and the story of the trek can best be told in diary form to give continuity and a general impression of conditions experienced. The Moving Force sent back regular despatches to the Base Camp by radio, and from these the diary can be compiled to contain all the most interesting features.

19th February.—The last seven in the column of eleven snowmobiles ground their way into Nannulla, an old abandoned trading post, at 9 a.m. after more than twenty-four hours of continuous battling against the elements. It had taken since midnight to fight their way over the last dozen miles through a driving snowstorm. They were towing one vehicle with a faulty petrol line. The Force refuelled from air-dropped supplies out on the Hudson Bay ice, and spent the day pitching camp and maintaining vehicles.

Lieut.-Colonel Baird's advance division of four snowmobiles had arrived at midnight and were already sleeping.

Word was received of the arrival of the Baker Lake Force the day before, and it expected to commence clearing an ice landing strip for the Dakotas immediately.

20th February.—For the third day since leaving Churchill bad weather forced a halt. High winds and a surface blizzard reduced visibility to zero and made travel impossible.

21st February. — The morning found the column well on its way to Eskimo Point, a start having been made after midnight when the weather cleared and a bright moon made visibility good. The day was bright, good going was maintained, and Eskimo Point was reached as planned at 8 p.m. The distance covered was ninety miles.

Work on the landing strip at Baker Lake had been slowed up because the caterpillar bulldozers had been badly shaken on their 400-mile overland journey from Churchill. But crews returning in the evening from air-dropping sorties said they had landed on a strip 3,500 feet long which had been produced by sheer hard work.

23rd February.—After a one-day halt the Force left Eskimo Point for Baker Lake. Weather was fine and clear, with the temperature 48 degrees below zero. Thirty-two miles were covered by lunch.

Erratic magnetic activities had made radio communication difficult at Eskimo Point, but once on the way again reception at the Base Camp had little or no interference.

25th February.—A dense surface blizzard was encountered and the expedition had to halt and make camp. The distance still to run to Baker Lake was given as 150 miles.

26th February.—An advance of forty miles was made, but mechanical difficulties with the vehicles was being encountered. These difficulties were expected. The entire right suspension for a snowmobile was parachuted to the column, and mechanics were faced with an uncomfortable, all-night repair job that would tax ingenuity and patience to the limit.

27th February.—An interesting arrival at Churchill was Wing Commander R. Winfield, D.F.C., A.F.C., R.A.F., representing the Medical Branch of the Royal Air Force. He had come as an observer on aviation medical research and had been medical officer on board the Lancaster "Aries" on her flight across the Polar Cap in the previous summer.

28th February.—Poor visibility had again forced a halt upon "Musk-Ox" after an advance of some eight miles. This placed them ninety miles from Baker Lake. Aircraft were grounded back at Churchill for the same reason.

1st March. — The Moving Force reached Baker Lake little more than three days behind schedule.

Lieut.-Colonel Baird, with the first division of the force of four snowmobiles, reported an excellent run over the barrens, and a distance of 100 miles was covered in the day.

The remaining two divisions, comprising eleven snowmobiles, came in several hours behind, having been delayed through lack of fuel. Bad weather had made it impossible for aircraft to drop sufficient quantities the night before. Moreover, due to a 40-miles-an-hour blizzard, the crews had not been able to make proper camp on 26th February, and eleven of the men became ill with carbon poisoning as they sat out the storm in their enclosed vehicles. All soon recovered, and difficulties already encountered were taken in hand during the stop at Baker Lake.

2nd March.—After three days during which aircraft were grounded by the winter's worst blizzard, the weather cleared, enabling Dakotas to drop more supplies and to land on the ice strip. During the past week, Baker Lake was stocked up with food and petrol flown in by the Dakotas, as it was to be an emergency landing ground when the Moving Force continued northwards to Cambridge Bay.

Meanwhile, from Yellowknife, in the North-West Territories, the advanced R.C.A.F. detachment had flown the first supplies into Cambridge Bay on 1st March. One of the navigators said that navigation in the Arctic was one of the prime problems but with the aids fitted in the Dakotas there was little risk of getting lost.

The first glider to be tested under Arctic conditions was expected at Churchill within a day or two. It was to be used to make local test drops before being included in the general supply plan. Experiments were to be watched by British and American observers.

9th March.—The column was having difficulty with the rough terrain, strewn as it was with rocks "as big as bungalows," and was not maintaining schedule in consequence. Indeed, the going proved so hard that only five miles were covered that day. Another hindrance was the fact that the maps and charts used had many times proved inaccurate and caused delay. For this leg, Capt. Back's maps were being used, and they were well over a hundred years old!

10th March. — The Moving Force was reported still to be traversing rocky and uncharted country. Good progress of fifty-two miles was made by 6 p.m., which placed it about 140 air miles north-west of Baker Lake.

14th March.—Perry River was reached eight days behind schedule. In view of this, the two-day stop planned was cut down to one.

To supply the Perry River base, the R.C.A.F. had surpassed anything that could have been hoped for. Two Dakotas, three R.C.A.F. and one loaned from the U.S.A.A.F. were prepared at Churchill, and two more at Yellowknife. A survey flight was carried out in a "Norseman" in the face of prolonged weather delays. The pilot, Squadron Leader J. Coombes, A.F.C., had landed at Perry River on 8th March, and at once set to work marking out a landing zone. He also showed the Eskimos with him how to detach the parachutes and stack the supplies. As soon as he was ready he sent word by radio to Churchill. With one aircraft as leader, the four Dakotas set off for their destination, 700 miles away. All were off the ground within fifteen minutes.

Wing Commander Showler said that navigational problems in this region were almost unbelievable. Due to the proximity of the magnetic pole about 250 miles away, the magnetic compass was useless. A successful drop required flying by day, and this prevented the use of astro-navigation. The land around Perry River is barren and flat with no ground features to assist pin-pointing. Because of these difficulties it was decided that the first plane to locate the post would home the others.

The leader arrived first and homed the

others. The radio on Squadron Leader's aircraft played a large part in this homing scheme. The aircraft from Yellowknife flew 550 miles and arrived as planned within a few minutes of those from Churchill. Between the six of them, they dropped nine tons of supplies within an hour and nothing was damaged. As a result of this most successful drop, "Musk-Ox" had ample supplies on hand to carry it to Cambridge Bay, 150 miles across the ice of Queen Maud Gulf.

15th March.—The 150-mile run over the ice was completed in two days, only five days behind schedule. The original "Musk-Ox" plan called for a ten-day stay at Cambridge Bay for maintenance and resupplying. It was also planned to send three or four snowmobiles on an excursion to Denmark Bay, 100 miles to the north-east. In view of the previous delays, Lieut.-Colonel Baird, Force Commander, reduced the halt and revised the schedule.

18th March.—Three snowmobiles carrying fifteen men set out on a four-day scientific excursion to Denmark Bay. Magnetic observations were made for the purpose of determining declination and other polar elements of a purely scientific nature affecting the general magnetic structure of the earth.

20th March.—Whilst the Moving Force halted at Cambridge Bay the lines of supply were reorganized to overcome the problems of distance and the vagaries of the Arctic weather. The entire Base Force, which was charged with maintaining lines of communication and supply essential to the Moving Force, had now to be moved westwards. A rear base was established at Edmonton, and an advanced base at Norman Wells, with an alternative at Yellowknife. Lieut.-Colonel Cleghorn, Base Commander, made his headquarters at Norman Wells, and Wing Commander Showler established his operational base at Yellowknife, considered to be more feasible for overall control of supply flights.

30th March.—For the first time in history a glider was successfully launched and picked up north of the Arctic Circle. It was a combined R.C.A.F. and U.S. Army Air Corps effort, and marked a new phase in air supply. The glider was piloted by Lieut. Hopkins, of the Army Air Corps, with Flight Lieut. E. W. Smith, D.S.O., of the R.C.A.F., as co-pilot. It carried a new engine for a snowmobile of the Moving Force, and was towed into the air shortly before 3 a.m. by an Air Corps Dakota.

Flying conditions were almost perfect as the pair climbed to 5,000 feet to clear the hump of the Franklin Mountains. The tree-line was

crossed at dawn and the frozen Coppermine River was soon spotted and followed to its mouth. Coppermine was reached three and a half hours after take-off, and the men of the Moving Force could be seen below mingling with the population of the tiny settlement on the shores of the Arctic Strait.

The glider was cut loose and dropped quickly to the snow-covered ice. It was only thirty-six minutes from the time it was dropped before it again became airborne. In less than ten minutes the snatch rig was installed, but there was a slight delay in unloading the heavy eight-cylinder engine. A perfect "snatch" was made at the first attempt. The glider seemed to leap from a cloud of snow, and there was but a slight jar to the Dakota as the tow-line took the strain.

The glider was a standard Waco, type C.G.4, used on many European invasions and known by the more familiar name of "Hadrian."

3rd April.—The column was reported fiftyfive miles south-west of Coppermine, which put them across the tree-line for the first time since leaving Churchill.

The route ahead, a winter tractor trail, was reconnoitred by a Dakota to investigate sites to be used as caches for fuel and supplies dropped by air.

10th April.—After three pleasant days at Fort Radium a start was made for Fort Norman, 270 miles to the south-west. Seventy miles were covered on the first day, but pressure cracks in the ice limited speed. Several four-by-eight timbers the Force carried from Fort Radium were used to bridge at least four of the more serious breaks in the ice.

By 10th April the force was still in the ice of Great Bear Lake and within forty-five miles of Fort Franklin.

13th April.—"Musk-Ox" reached Norman Wells at 9 p.m. after the hardest day's travel since leaving Churchill. A 14-mile stretch of stump-strewn track had proved a formidable obstacle to the snowmobiles. Deep, soft snow added to the difficulties. It took more than nine hours to cover the fourteen miles as the men advanced ahead of their vehicles with axes, cutting down and rolling clear the logs.

In the afternoon an attempt to "snatch" a glider from a small lake near by failed. Capt. R. M. Croome, Medical Officer for the Moving Force, had arranged an experiment to determine exact conditions to which a stretcher would be subjected in being evacuated by glider. He had himself placed on an improvised stretcher and one of his legs bound in a splint. He was loaded thus aboard the glider ready



Constructing a protective wall



An engine-heating device being used on a "Dakota"





Constructing a snow hut



The Snow Mobiles preparing to start



for the air snatch by a Dakota. Hook-up with the aircraft was made satisfactorily but deep, powdery snow proved too heavy going to achieve take-off, and the tug released the \$600 nylon tow rope automatically from its winch gear. The glider used was again a "Hadrian."

16th April.—Well on the way from Norman Wells, the Moving Force was finding it hard going over deep, soft snow and difficult bush trails. The warmth of sunny afternoons softened the snow and rendered progress slow and heavy. These conditions caused the Force Commander to decide to travel by night and sleep by day, i.e., travel from 9 p.m. until noon the following day.

19th April.—The snowmobiles continued to make their way along the old "Canol" tractor trail and were reported eighty-five miles from Fort Simpson. The trail was essentially a winter road and ran through dense bush, and along small rivers and lakes. The entire route was littered with relics of its once heavy and important traffic of fuel oil drums. There had been no traffic over it the previous winter and it was clogged with deep snow.

Thereafter, from Fort Nelson, the Alaska Highway provided good travelling conditions right down to Edmonton, where the Highway itself begins and where Exercise "Musk-Ox" was brought to its conclusion.

CONCLUSION

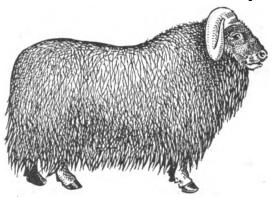
Working together under winter conditions unparalleled on the North American continent. Canadian and U.S. observers with the Exercise "Musk-Ox" were able to make substantial improvements in winter equipment produced by both countries. Discoveries made were expected to prove valuable not only to the armies of both countries, but also to civilians living in the extremely cold winter climates of Canada and the northern U.S.

Whilst the exercise was a purely Canadian Army venture, using Canadian-made equipment and clothing almost entirely, American observers invited to accompany the Moving Force took full advantage of the opportunity to test U.S. equipment. On-the-spot changes in clothing, food and other supplies were made, and requests for special equipment were flown from America to the Arctic in a matter of days from receipt of the request. The modified equipment could thus be tested under the same conditions.

Canadian research observers carried out tests on every sort of item, from water containers to tents, including shelters, heating and cooking appliances, lighting, rations, sleeping gear, footwear, gloves, caps, fuels and lubricants.

During the exercise the Canadians had been constantly alert to the need for improvements in equipment, and amongst other things they evacuated by air vehicle heaters which were not satisfactory, received an improved type, and were provided also by air with new load-carrying sleds to be towed behind the snowmobiles.

An interesting sidelight on the expedition was contained in an article in World Review of June, 1946, entitled "Is Canada in Danger of Invasion?" It connected Exercise "Musk-ox" with a statement made by the Premier of Ontario that invasion of Canada was planned by a European power, and it noted with this the trials of certain scientists for breaches of security and the discovery of uranium in the North-West Territories. The author of the article says, "As this (Musk-Ox) is the fourth exercise in four years planned to test modern Army transport, weapons and supply lines under frozen conditions, it would seem that Canadian defence officials are anxious not to be caught napping if an invader were to attempt an entry from the North." Be this as it may, the results of "Musk-Ox" were likely to be beneficial to both peaceful and military ends.



Royal Canadian Air Force



Operations in 1945

ROM a strength of 4,606 in September, 1939, the Royal Canadian Air Force rose to a total of 206,350 in December, 1943. By September, 1945, this number had fallen to 139,652. During the six years of war the Force suffered casualties in killed and missing of 16,977, of whom twenty-one were members of the Women's Division.

The Royal Canadian Air Force overseas contingent comprised forty-eight squadrons, all under the operational control of the R.A.F. These units included fifteen heavy bomber squadrons, fourteen functioning as No. 6 Group of Bomber Command and one in the Pathfinder Force. Of the seventeen day-fighter squadrons, fifteen were organized in four wings as part of the Second Tactical Air Force and operated on the Western Front. One, based in England, acted as escort on heavy bomber raids, while another was a component of the Desert Air Force working with the Allied armies in the plains of Lombardy. Two R.C.A.F. night fighter and two intruder squadrons flew Mosquitoes from bases in England and Western Europe. In Coastal Command, six R.C.A.F. squadrons worked in close co-operation with the Allied naval forces, while in Coastal Command there were three squadrons. There were also three Air Observation Post squadrons using Austers. In addition, many thousands of R.C.A.F. personnel served in R.A.F. units.

The night sorties of the "Halifaxes" and "Lancasters" of the Canadian Bomber Group complemented the daylight raids of the U.S.A.A.F. on industrial and communication targets in Germany until, in the spring of 1945, the R.C.A.F. Group itself entered the daylight operational field. In addition to strategical bombing the Group on occasion made tactical forays in support of ground operations, such as a raid on Goch in preparation for a Canadian advance from Nijmegen to the Rhine and another on Dresden in direct support of the

Russians. In the closing days of the war the tempo of bombing activities increased to such an extent that on one occasion the fifteen squadrons provided over 500 aircraft for two attacks on Duisburg within twenty hours and frequently had 290 airborne on a single mission. The last bomber operation in which the R.C.A.F. squadrons participated was that on Wangerooge, an island in the East Frisians, on 25th April; following this they were occupied with the transporting of liberated prisoners of war and supplies.

The day-fighter squadrons were relentless in harrying the enemy both in the air and on the ground and were notably effective in assisting to rout the German Army in the St. Vith—Houffalize pocket and in supporting the Second British Army in the crossing of the Rhine. The night fighters operating from the Continent carried out defensive patrols against night raiders and flying bombs while the intruders patrolled

enemy airfields far into Germany.

One transport squadron operated between Great Britain and the Continent, participating in the airborne lift in the Rhine crossing of 24th March, and evacuating liberated prisoners of war and casualties. The other Dakota squadrons performed similar duties in India and Burma. Following the cessation of hostilities in Europe the squadrons were joined by one of the heavy bomber units which had been re-equipped with Liberators and diverted to transport work. Their duties consisted mainly in transporting repatriated prisoners of war and other personnel from the Far East to the United Kingdom.

The functions of R.C.A.F. Coastal Command squadrons were varied. One, which had been flying Catalinas over the Indian Ocean for almost three years, completed its work in that area and returned to England in the spring of 1945. Two Sunderland squadrons in the British Isles and one Canso unit in Iceland did yeoman service in the protection of convoys

in the North Atlantic and the approaches to Great Britain. A fifth squadron, equipped with Beaufighters, and later with Mosquitoes, operated off the Norwegian coast in search of enemy shipping, while a sixth, flying Leigh-Light Wellingtons, did similar work in the Bay of Biscay, the English Channel and the Irish Sea.

To meet the needs of the Canadian Army in the field, three Air Observation Post squadrons were formed in the last months of the war. Commanded by Army officers and manned by Army pilots, but administered and maintained by the R.C.A.F., they acted as the eyes of the Army in directing counter-battery

shoots and artillery ranging.

In Canada, the R.C.A.F.'s activities were two-fold—coastal operations against U-boats and training. The comparatively small number of sinkings in the R.C.A.F.'s patrol area in the North-West Atlantic testify to the success of the first-named operations. The large number of graduates of the British Commonwealth Air Training Plan which, at its termination on 31st March, 1945, had trained 131,553 air crew members for the R.A.F., R.A.A.F., R.C.A.F., and R.N.Z.A.F., is the proof of the second. Of these, approximately 55 per cent. were from the R.C.A.F., 32 per cent. from the R.A.F. and the balance Australians and New Zealanders. Of the total 38 per cent. were pilots, 23 per

cent. navigators, 12 per cent. air bombers, 25.5 per cent. wireless operator and air gunners, and 1.5 per cent. flight engineers. Pupils were drawn not only from the Commonwealth but also from Belgium, Czechoslovakia, France, Mexico, the Netherlands, Newfoundland, Poland, South America, the United States and the West Indies. Over 104,000 Service and civilian personnel were employed in 360 units set up on 231 sites, and Canada's share in its financing amounted to \$1,281,000,000.

After VE Day the R.C.A.F. turned to three

tasks:

- (a) The formation of a force to share in the occupation of Germany;
- (b) The constitution of a Pacific Force, which owing to Japan's capitulation, did not get into action; and
- (c) The demobilization of personnel not required for (a) or (b) or the post-war R.C.A.F.

Seventeen squadrons remained overseas in the occupational force and for transport duties; of these, seven have been disbanded and only ten remain. Until plans for the post-war R.C.A.F. can be determined an interim force is being organized, in which personnel sign up for a two-year period with preferential consideration for entry into the permanent force at the end of that time.

A Brief History of No. 6 (R.C.A.F.) Bomber Group

O. 6 (R.C.A.F.) Bomber Group was Canada's most potent contribution to the air offensive and was, in fact, one of the most powerful groups in the whole of Bomber Command.

The Group was a direct development from the British Commonwealth Air Training Plan. There had been no thought, when the R.C.A.F. was first mobilized in September, 1939, that Canada would ever be able to forge and wield so mighty a weapon, but the spectacular success of the training plan had made it clear by the middle of 1942 that the R.C.A.F., in addition to its already immense commitments to fighter and coastal commands, and in addition to its undertaking to provide steady and adequate streams of reinforcements to existing R.A.F. squadrons, would be able to undertake the task of forming a complete group within Bomber Command. Such an undertaking involved the commitment of at least 15,000 men.

The decision was made during the visit in 1942 of the Air Minister, Major the Hon. C. G.

Power, M.C., to Britain for consultation with the British Air Ministry. Major Power announced his decision shortly after his return to Canada, and steps were already being taken overseas to implement it.

At the time, only four R.C.A.F. bomber squadrons were in existence; an average-sized bomber group needed many more than that. So, in the autumn of 1942, the planners went to work to form seven or eight new squadrons. One of these was the now-famed "Alouette" formation, manned largely by French-speaking Canadians. By the end of this year, most of these new squadrons had enjoyed their first taste of combat experience.

But there was more to it than forming new squadrons. A headquarters and operating bases had to be set up for the group. For this purpose one of England's stately homes, an immense castle, Allerton Hall, on a beautiful Yorkshire estate, was requisitioned, and the first Air Officer Commanding, Air Vice-Marshal G. E. Brookes, O.B.E., began to

assemble his headquarters staff. The R.C.A.F. took over several big bomber bases from the R.A.F. and by the end of December the Canadian squadrons, all by this time concentrated at bases in Yorkshire, received a message from Bomber Command headquarters in Bucking-hamshire. The message was marked "secret" and advised all squadron commanders that from one minute after midnight on 1st January, 1943, they would get their operational instructions from the new No. 6 (R.C.A.F.) Bomber Group.

At the time almost all the squadrons were operating with twin-engined Wellington aircraft whose range and weight-carrying capacity seem puny in these days of Lancasters, Super-Fortresses and 22,000-lb. bombs. Nevertheless, from the very first, the Group contributed its just share to every major Bomber Command operation. Later in the year its squadrons began to convert to four-engined Lancasters and Halifaxes, and other completely new squadrons were added to its strength; but despite the inevitable interference with operations which conversions to new aircraft involved the Canadian bomber group, by the end of 1943, had dropped 13,639 tons of bombs on the enemy, out of a total of somewhat over 80,000 tons dropped by Bomber Command as a whole.

But in 1944 they made even this record look small. In that year the Canadian group dropped as many bombs as the whole of Bomber Command had dropped in 1943—and more, incidentally, than the whole R.A.F. had dropped on Germany and occupied Europe during the first two and a half years of the war. Its record for the year was 86,504 tons; in other words, it had increased the weight of its attacks more than six-fold. In 1945, targets were harder to find, and the rate decreased slightly, being 25,431 tons for the first four months of the year up to VE Day; but by that time the main job was finished and the Germans' power to make war had been broken.

Air Vice-Marshal C. M. McEwan, C.B., M.C., D.F.C. and Bar, known to every man and woman in No. 6 Group as "Black Mike," took over command in March, 1944. Previously he had commanded the Group's biggest and most powerful base, comprising three stations of two squadrons each. His succession to the command roughly coincided with the transition of the last remaining squadrons from twin-engined to four-engined aircraft; this was accomplished in time for No. 6 Group to drop devastating quantities of bombs on enemy installations in Northern France in preparation for the invasion. The softening-up campaign proceeded on

an awesome scale and reached its highest peak when the Canadian group dropped more than 1,000 tons during the 24-hour period of the initial landings on 5th/6th June, 1944.

From then on, the Canadian bombers flew almost invariably in direct support of land operations, frequently on daylight missions against heavily defended objectives, but never once failing to attack and hit their targets. When the final collapse came, the Group swung without a day's delay into new and much more pleasant business. Firstly, it flew Allied prisoners back to the United Kingdom after their release from German prison camps (No. 6 Group flew 5,304 such men back in all), and, secondly, it dropped supplies to the starving people of north-western Holfand.

Operations against the enemy accounted for 814 aircraft of the Canadian Bomber Group from its formation on 1st January, 1943, to the end of the European war. The Group conducted 40,822 operational sorties, during which 126,122 tons of bombs and mines were

dropped.

A total of 6,267 men were listed as killed or missing as a result of Group aerial activities up to the cessation of hostilities. Of this figure, however, a large number of men were reported as prisoners of war and later returned safely. Other casualties included 340 men injured on operational flights.

The final statistics for the two years and four months in which Group aircraft blasted Nazi

targets were as follows:

Men Listed as Killed or Missing.—1943, 2,488; 1944, 2,991; 1945, 788. Total: 6,267.

Men Listed as Injured.—1943, 121; 1944, 168; 1945, 41. Total: 340.

Operational Sorties. — 1943, 7,355; 1944, 25,353; 1945, 8,114. Total: 40,822 (including 2,594 mine-laying sorties on which 6,375 mines were laid).

Percentage of Aircraft Missing.—1943, 4.6 per cent.; 1944, 1.48 per cent.; 1945, 1.2 per cent. Total: 2 per cent.

Number of Aircraft Missing.—1943, 340; 1944, 377; 1945, 97. Total, 814 (of which 39

were lost on minelaying work).

Tonnage of Mines and Bombs Dropped.—1943, 13,630; 1944, 86,503; 1945, 25,989. Total: 126,122 (of which 3,231 tons were mines).

Operational Flying Hours.—1943, 59,534; 1944, 160,111; 1945, 52,536. Total: 271,981.

Training Flying Hours.—1943, 30,127; 1944, 66,567; 1945, 24,299. Total: 120,993.

Number of Encounters with Enemy Aircraft.—1943, 344; 1944, 701; 1945, 267. Total:

Mediterranean Air Transport Service, 1943-5

By SOUADRON LEADER R. A. ABBOTT

■ EDITERRANEAN Air Transport Service was the first, and perhaps the only truly Anglo-American military airline organization.

Set up by General Eisenhower and Lord (then Sir Arthur) Tedder, and based at Algiers, M.A.T.S. began to operate in May, 1943. Its ground staff were mixed U.S. Air Corps and R.A.F. officers and men, its aircrews were squadrons from U.S. Troop Carrier formations, U.S. Air Transport Command, and R.A.F. Transport Command. Its area of operations was the Mediterranean Theatre, originally confined to North Africa.

The general character of modern warfare, and the peculiar circumstances existing in the Mediterranean area made it essential that the maximum available amount of air-transport should always be operating, while the fact that the Mediterranean campaign was the first big Anglo-American combined effort made it more than desirable that both Allies should have equal access to the air-transport facilities. There was also the need to prevent open or covert rivalry between the Allies, who might and at times did seem to have at least half an eye on the prospects for their national post-war civil airlines, and who were therefore inclined to dig themselves in at strategic airfields, and to be reluctant to hand them over to the other partner. Maison Blanche (Algiers) airfield, which changed hands several times between 1943 and 1945 was a case in point, as were others, including the two Naples airfields of Capodichino and Pomigliano.

A formation with local authority higher than that of either the U.S. Air Transport Command or the R.A.F. Transport Command was required, and with the creation of M.A.T.S. the need was to a large extent supplied. The small French group (Reseau Aerien Militaire Francais) was incorporated into the general scheme, as were later some even smaller Italian units, but M.A.T.S. was always fundamentally an Anglo-American organization, with the American and R.A.F. carriers operating in the fairly constant proportion of 60 per cent. American to 40 per cent. British, a proportion originally based on an estimate of the division of Allied forces in the theatre.

M.A.T.S. carried anything and anybody considered by the Priorities Board to be useful to the war-effort, from anti-typhus powder, N.A.A.F.I. and "P.X." supplies and E.N.S.A. artistes to "V.I.Ps." (Very Important Persons). The Commanding General of the M.A.T.S. was also Chairman of the Priorities Board.

In its heyday of 1943, Maison Blanche airfield was probably the busiest in the world, and the M.A.T.S. Air Booking Centre in the Rue d'Isly was as crowded all day with prospective passengers as is Piccadilly Circus Station during rush-hours, tiring and trying for the Anglo-American staff who ran it. By 1944 the scene had shifted to the Naples Air Booking Centre in the Piazza Vittoria, then later to Rome and Marseilles, finally to Milan, Venice and Austria.

Originally commanded by the American Brigadier General Kauch, with Group Captain (now Air Commodore) Bates as his deputy, then by Brigadier General Beau, with deputy Group Captain MacDonald, M.A.T.S. had its vicissitudes as well as its triumphs. Early in 1944, with the growing strength of U.S. A.T.C. and R.A.F. T.C., it almost seemed as if M.A.T.S. might be squeezed out, divided into separate American and British formations, but at the critical moment something quite different happened. M.A.T.S. blossomed out with its own two Transport Squadrons and one Ferrying Squadron, the latter spread out with flights at Casablanca, Tunis and Naples, while M.A.T.S. "Flying Forts" daily carried 9-10,000 lb. of U.S. Forces mail between Naples and Casablanca. At the same time it was agreed that while M.A.T.S. would itself operate only those transport airfields within the battle-area, its field contingents would be at every Mediterranean airfield where either the U.S. A.T.C. or R.A.F. T.C. were installed. Thus, by 1945, there were M.A.T.S. officers and men at every transport airfield between Casablanca, Gibraltar, Algiers, Tunis, Cagliari, Ajaccio, Marseilles, Dijon, Naples, Rome, Milan, Venice, Athens, Klagenfurt and Salzburg, receiving and dispatching M.A.T.S. aircraft, helping U.S. A.T.C. and R.A.F. T.C. staffs, compiling local traffic figures, and generally keeping the often distant M.A.T.S. Headquarters informed of the air-transport situation.

It was M.A.T.S. policy that at an Americancontrolled airfield the M.A.T.S. contingent should be commanded by a British officer, and vice versa, but the contingent itself was usually composed of both British and American officers and men. It could not be said that M.A.T.S. contingents were always welcomed by local British or American commanders; it could not be said that there was always perfect harmony within M.A.T.S. itself. It was hardly to be expected that it could be so, but the remarkable thing was the high degree of co-operation and harmony that was achieved, especially in view of the fact that the R.A.F. element of M.A.T.S. was always a minority, at times a small minority, and that M.A.T.S. equipment from aircraft to typewriters and blankets was overwhelmingly American. At times the R.A.F. members of M.A.T.S. could scarcely avoid feeling that they were living on American charity, but if that were so it was not to be blamed on anyone inside M.A.T.S., if indeed blame could be laid at anyone's door. The Mediterranean Theatre had begun as an American "show," and except in the 8th Army-Desert Air Force area it continued to be predominantly American, even although the Supreme Commander was British, and the American 5th Army at times of decision was known to contain a majority of British front-line troops.

Everything about M.A.T.S., the achievement of its objectives required at all times the very maximum of tact and forbearance by all sections and ranks, something that was later required and achieved in organizations such as

S.H.A.E.F."

Strictly speaking, neither the U.S. A.T.C. Headquarters in Washington, nor the R.A.F. T.C. Headquarters in London could enjoy havits Mediteranean formations controlled by an outside authority such as M.A.T.S., however elastic and tactful that control might be. The two Commands could not be expected to like having airfields allocated to them, being required to transfer control of airfields from time to time, having routes and traffic schedules drawn up for them. Nor, as already mentioned, did some Station Commanders like having M.A.T.S. contingents on "their" airfields, asking for traffic figures, and using "their" facilities. If M.A.T.S. had tried to deal in a highhanded way with the Commands and formations, if it had been seriously divided within itself, it could not have functioned at all, and it would certainly not have continued to enjoy the support of Mediterranean Allied Air Forces, the supreme air authority at Caserta. Faced with these formidable psychological obstacles, M.A.T.S. succeeded admirably, and credit for this achievement was due to all ranks, from the Commanding General and Group Captain to the lowliest A.C. and private.

For the highest ranks of M.A.T.S. success entailed frequent conferences in London and

Cairo, as well as at Caserta and M.A.T.S.'s own Naples Headquarters; it meant giving in on one point, holding firm on another, always bearing in mind-national and inter-Service susceptibilities. For an M.A.T.S. Field Office Commander it meant earning the confidence of the local Station Commander and his section chiefs, showing them that he was there to help, not to hinder or interfere. For the contingent's junior officers, airmen and "G.I. Joes" it meant getting along, first among themselves, then with the local men with whom they would have to deal, on whom they would have to depend, who would have to depend on them.

The aircrews of the purely M.A.T.S. Squadrons were entirely American, and at first they did not all take easily to having R.A.F. officers as their local representatives at some stations. R.A.F. officers and men sometimes found American casualness and apparent lack of discipline hard to get used to, but both sides did get used to these things, and grew to think of themselves as belonging to M.A.T.S., not just to the R.A.F. or to the U.S. Air Corps. In the same way, R.A.F. flight lieutenants learned to take orders cheerfully from American majors and colonels, and American P.F.Cs. readily worked under the orders of R.A.F. sergeants. It was necessary, and after a time they never questioned the authority of the other uniform. if indeed they had ever done so. Most of them, American and British alike, never did question

it, openly or secretly.

If justification of M.A.T.S.'s existence were needed, it lay in the fact that day in and day out R.A.F. and American transport aircraft flew all over the Mediterranean area on schedules set up by M.A.T.S., that a British serviceman or entitled civilian knew he could get a seat on an American aircraft if he held the necessary travel authority, that an American could have the same confidence in similar circumstances, that U.S. A.T.C. would honour a ticket issued by R.A.F. T.C., and vice versa. that the Priorities Officers, British and American, were working on the same grading system. and allocated Priorities 1, 2, 3 or 4 on the urgency of the individual mission, not on the uniform or rank. The transport squadrons kept on flying; thousands of passengers, millions of pounds of mail and freight were delivered when and where they were wanted, at the front line or in the rear areas. It had not been done before on an Allied basis, but M.A.T.S. showed that it could be done.

Perhaps the greatest tribute to M.A.T.S., to what it did and to how it did it, was the fact that so many Allied servicemen who travelled

by air in the Mediterranean Theatre were either unaware of the existence of M.A.T.S., or else thought it was just an adjunct of U.S. A.T.C. or of R.A.F. T.C., whose activities they were rather inclined to take for granted.

There would probably have been a very different story to tell if M.A.T.S. had never been invented, and when, with the war over, it was finally broken up into its two component parts on 31st August, 1945, all who had been connected with M.A.T.S. could look back with

satisfaction on having taken part in a great experiment, one that, with its parent bodies Allied Force Headquarters (A.F.H.Q.) and Mediterranean Allied Air Forces (M.A.A.F.) had set the pattern for later Allied co-operation in North-West Europe and elsewhere. There had been tears and sweat, disappointments and setbacks, but there had also been a large measure of achievement.

It had been well worth while.

A Rocket Posting

By FLIGHT LIEUTENANT ARTHUR HAILEY

Folio 26A

To: The Under Secretary of State.

SIR

I have the honour to inform you that communications are arriving at this Station addressed to "Officer Commanding." As the Station is commanded by an officer of air rank, these should of course be addressed "Air Officer Commanding." It will be appreciated if a Ministry order may be published notifying the correct procedure.

F. W. FERGUSON, Air Commodore.

13th June.

Minute 1

To: S.20(a).

Reference folio 26a.

There are several other stations also commanded by air officers. However, no official reference book indicates which these are, and until this is rectified, mistakes are bound to occur. It is suggested, therefore, that the letters "A.O.C." should be inserted after the name of the station in the geographical index of units.

P. S. EPMAN, Group Captain.

17th June.

Minute 2

To: P.M.30.

It seems to us that an officer of air rank who commands a station is not entitled to be called A.O.C., and that he should be known as "Officer Commanding" irrespective of rank. King's Regulations clearly state that an A.O.C. can only command a Command or Group. In addition, the latter has many disciplinary and financial powers which are not given to an officer commanding a station.

D. O. DONALDSON, *Principal*.

Minute 3

To: S.20(a).

I cannot agree with your definition of the term A.O.C. Surely the explanation in King's Regulations concerns only the legal aspect. All Air Commodores are air officers and I fail to see why they should not call themselves A.O.C. station, as in fact they do.

24th June.

P. S. EPMAN, Group Captain.

Minute 4

To: P.M.30.

It is clear that an air officer commanding a station is not an A.O.C. for disciplinary, administrative and financial purposes. To give official recognition (as suggested in Minute 1) to the practice whereby such officers describe themselves and are addressed as A.Os.C., would be to recognize the existence of two kinds of A.Os.C.: those who are and those who are not A.Os.C. for the purposes mentioned. Such a scheme would undoubtedly lead to confusion.

If you are dissatisfied with this ruling, it is suggested that the matter has now reached the stage where it should be referred to higher

authority.

D. O. DONALDSON,

27th June.

Principal.

Minute 5

To: Personal Assistant to Director General.

Reference Minutes 1 to 4. It is felt that this is a matter for the Director General's decision.

May it be referred to him, please?

P. S. EPMAN, Group Captain.

29th June.

20th June.

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Minute 6

To: P.A.

Who started all this?

P. D. Q., Air Vice-Marshal,

2nd July.

Director General.

Minute 7

To: Director General.

See folio 26a. The matter was raised by the "A.O.C." or "Officer Commanding" R.A.F.

Station. -

D. W.,

3rd July.

Personal Assistant.

Minute 8

To: Personal Assistant.

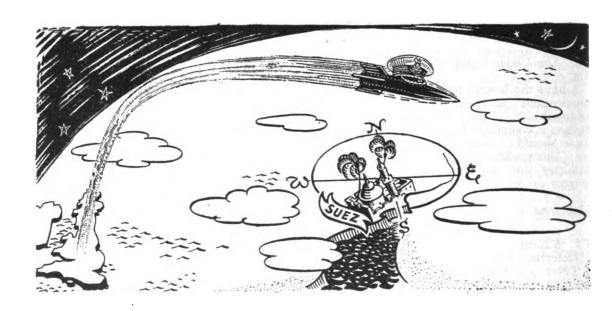
My own opinion is that the officer's address should be changed altogether—somewhere east of Suez for instance. Have the postings people fix it.

No further action.

5th July.

P. D. Q., Air Vice-Marshal, Director General.

(In other words, Air Officer, "you've had it.")



IND COOPE & ALLSOPP

The Popular Beer

Memoirs of an Early Flying Instructor

(Continued from page 171, Vol. 17, No. 3)

BY LIEUT.-COMMANDER (A) F. WARREN MERRIAM, A.F.C., F.R.AE.S. (Late R.A.F. & R.N.V.R.)

VII.—1914

ANUARY 1st was a happy new year for at least one person. He was Sub-Lieut. F. G. Saunders, R.N.V.R., for on that day he obtained his brevet under the new rules of the Royal Aero Club.

It was some years later that I accidentally bumped into him when walking in the West End of London. His companion, and incidentally his aeronautical business partner then, was no other than another war-time Chingford pupil of mine, Capt. E. L. Pralle. Major Saunders later wrote:

It was a great treat to be able to talk about old times together. I have always said and still uphold, that there was no one who could give instruction in flying as well as you. I remember how you got me through in two hours and fortyfive minutes, in the air, it being necessary for me to pass in a certain time, and I put down my little successes during the war to your careful early instruction."

A couple of weeks after Saunders had blossomed into a fully-qualified pilot, a merry trio followed suit. They were Lieut. J. T. Cull, R.N., Sub-Lieut. J. R. W. Smyth-Pigott, R.N., and Lieut. H. E. M. Watkins, R.N.R. (later Wing-Commander, A.F.C., R.D., R.A.F.). These three pupils were evidently delighted with their success. The latter has since reminded me how their hearts warmed towards the Official Observer. He writes:

"After Cull, Smyth-Pigott and self had passed for our tickets, we thought we would like to give a small present to the man who had stood out on the aerodrome in the cold January morning. I obtained a banana from the "Blue Bird" and we each put a sovereign inside of it, and just as he was going to take a large bite, I got the wind-up as I thought he might swallow one of the quids, so called out to be careful just as his teeth met on one of the gold coins."

These three officers who gave up the sea for the air all came safely through years of good

After getting the last handful of pupils off, things were fairly quiet at the school. There were a number of prospective pupils booked for future dates, so in this interval I again took the opportunity of visiting Salisbury for more practice.

The pupils left under Halford's care were envious of my chances to fly various machines, especially the new Bristol tractor biplane. One of the pupils, Lieut. F. B. Binney, accompanied me in the train in order to fly with me at Salisbury, where the usual routine of flying and school work continued for a day or so when the weather permitted. I had bad luck, however, for on 26th January, whilst still at Salisbury, I was flying a dual-control monoplane with Mr. Lancelot Gipps as passenger on an instructional flight. The machine was termed a "sociable" and was fitted with a 50 h.p. Gnôme engine. It was very underpowered and so constructed that the pilot and passenger were seated side by side. The controls gave equal power to both pilot and passenger but, unfortunately, there were no means of disconnecting the passenger's control, as there is to-day, neither was the machine fitted with an engine revolution indicator, nor any other instruments.

We had made a circuit at a height of about 100 ft. with the engine ticking over very nicely. The wind was about 8 to 12 m.p.h. and everything went quite normally for about five minutes until, trying to make a left-hand turn, Gipps held rigidly to the rudder. I shouted to him not to hold so tightly, but it was obvious that he did not understand me, or could not hear owing to the noise of the engine, for he suddenly released his hold, causing me to rudder violently, and before I could recover this action the machine nosedived to the ground with a terrible crash. Luckily, I switched off before we struck the ground and by so doing probably averted a fire.

Poor Gipps was unconscious and died shortly afterwards. I sustained a broken jaw and other injuries, but managed somehow to step out of the machine and stagger a few yards before I collapsed.

Nobody told me that Glpps was dead, but when I enquired after him, I could judge by the replies that it was all up with him. I learnt afterwards that owing to my own state, it was not considered wise to let me know.

Capt. L. M. Griffin, who has flown with me, gave a short account of the accident as he witnessed it:

"I narrowly missed being on the machine at the time. We were drinking (only tea) in the sheds and Gipps and Merriam got up to take up the old side-by-side monoplane for a flight. As we heard them take off, we strolled to the entrance and the machine seemed to be flying well. Suddenly she did a flat turn, dropped her nose from about 100 ft. and dived with a sickening crash into the earth. One figure jumped from the machine, staggered a yard or two and collapsed. We rushed out. It was Merriam. Poor Gipps was in a worse way and mixed up in the controls. He lived only a few moments and never regained consciousness. I 'phone Bulford for a doctor and it was from the Military Hospital at Bulford Camp that I saw poor old 'Gippy' taken to his last resting place three days after.

"Merriam was taken to 'The George' at Amesbury, where the Bristol crowd, Jullerot, Sippe, Gordon England and Voigt spent many

happy hours and hectic evenings.'

I have often been asked to describe what my feelings were when I knew a crash was inevitable. No doubt other pilots in similar circumstances would uphold me in saying that one's mind is usually pre-occupied in the endeavour to right the machine and rarely is there time to give thought to fear. I had only a fraction of time, being at a low altitude, to do or think of anything except to turn off the petrol and switch the engine off to avoid fire on crashing.

Dealing with my own misfortune after the crash, I was removed to the Bristol Royal Infirmary, where a very tricky and clever operation was performed on my jaw. I lost a fine row

of teeth and half of my lower jaw!

At the enquiry, the Royal Aero Club Accidents Committee were of opinion that the accident was due primarily to ruddering violently when the aircraft was unbanked, causing it to side-slip outwards and to lose speed and nose dive. The over-ruddering was due to the action of the pupil in first resisting the control and then suddenly yielding. They recommended that in all dual-control machines used for instructional purposes means should be provided whereby the instructor could instantly disconnect the pupil's control.

Mr. Gipps was granted his aviator's certificate No. 513 on 13th June, 1913. These numbers will,

no doubt, interest the superstitious.

About six weeks after this lamentable accident, my first of a serious kind and naturally a very upsetting one, I lost no time in getting back to flying again at Brooklands. With flying, it was not advisable to keep too long away from it after a bad crash, as to do so evoked, or rather intensified, the feeling of nervousness which one was bound to contract with too much time for morbid thought.

There were no medical rules or restrictions governing us. We flew when we thought fit. Dr.

Allen Hope, of Addlestone, who was keenly interested in flying and was often a passenger with one or other of us, gave us friendly medical advice. There was no Air Ministry, either, to issue Ground Engineers' licences, neither were Airworthiness Certificates required. I was happy to be back amongst the roar and splutter of the Gnôme engines again. Whether I had anticipated that on my return pupils would not be so anxious to trust themselves in my hands owing to the likelihood of my shaken nerves or anything of the kind, I cannot remember, but in any case, it was a great joy to me to learn that their confidence was not in any degree weakened, and they were eagerly awaiting my return for tuition. This happy state of things buoyed me tremendously and if I had lost a grain of confidence, I was perfectly at ease.

Some days after my return, I read an account in the papers of an accident in which Sub-Lieut. Smyth-Pigott had been involved. I wrote asking if I could visit him in hospital. Judging by his reply, it had been a near thing with him. He

said:

"Many thanks for your kind letter. I do hope you are alright now. I sent you a wire imme-

diately on hearing of your accident.

"I was on my way to Upavon. I had a very lucky escape. A marvellous operation was performed on me here by Sir Arbuthnot Lane, steel plates being let into each leg, and I ought to be perfectly well and ready to fly again about September."

AMERICAN FLYING CORPS

At this time news of a happier nature reached me from another pupil, Mr. W. M. F. Pendlebury, who seemed pleased with life in the Signal Corps. He wrote from California:

"I was very sorry to hear of the bad luck you had on the monoplane. I hope you're fit again.

It must have been a great shock to you.

"I'm back in flying again and have found the American Flying Corps good pay—£25 a month all found (food and board) as an instructor. I've been flying a Curtiss a lot. Rudder used the same way as our Bristol warp (joystick right and left). The elevator used the same as the Bristol (forward and back), while the warp you work with your body. If falling to the right, you lean to the left and vice versa. They are simple to fly. The seat is in front of the lower wing and on the same level. I got up to 6,500 in one the other morning. They climb very easily but are apt to flicker if you are at all jerky with your controls."

On 8th April we were overcome by a shocking calamity at our School. Sergt. E. N. Deane was killed while undergoing his tests for his brevet.

LESSONS LEARNT AT CRUEL COST OF LIVES

It was before 8 a.m., and Deane had already done his two sets of five figures-of-eight in the air, descending safely after each set. He then had only to complete a volplane, or glide, from about 400 feet with the engine shut off, to comply with the Royal Aero Club's tests for his certificate.

It was a calm morning, the wind over the aerodrome blowing about three miles an hour, but I had noticed that the biplane appeared to drift in the higher altitudes during his previous flight, probably due to a stronger wind aloft, and so I told him to ascend about 400 feet only for his glide.

Watching him from the ground, I was astonished to see him rise higher and higher until he gained an altitude of over 1,000 feet. "He is going to make a spiral," I cried to the observers. I was right. Deane began making spirals down to earth when, to our horror, his machine executed a vol-piqué, or straight drop, and Deane fell forward out of the machine through 400 feet to the ground.

During the previous five weeks Deane had been doing a lot of flying, and for the last ten days had had complete control of the machine. He was a wonderfully clever pupil, but unfortunately, he was so full of confidence that he determined to finish his brevet performance with special brilliancy, and was not content with the simple glide to earth required under the rules.

In making the spiral descent the machine pointed at too acute an angle to the ground, which threw its pilot forward with the controlling column at the same time, further aggravating the sharp descent. Not being strapped into his seat, he could not regain control, and was bound to fall out.

There were lessons to be learnt and the hardest of these were often in the cruel school of supreme sacrifice. After the accident, the Royal Aero Club Accidents Committee strongly recommended that all aircraft should be fitted with some form of quick-release safety belt to secure the occupants to the machine.

Most of the pilots objected to being strapped in, however!

Whilst watching the machine descend I made a particular study of the antics of the biplane as it slowly manœuvred its way to the earth.

To my knowledge no accurate description of this performance was given. As a matter of fact, one eye-witness erroneously stated that the machine executed a somersault in the air after the unfortunate pilot had vacated it, but actually it gracefully floated and fluttered like a piece of paper, until within about 50 feet of the ground, when it did a straight, though not heavy, tail-drop to the ground, and gently concertinaed.

Proof of the gentle way in which it struck the earth was in the fact that the seats were not damaged at all, and had the pilot been rendered helpless in the air, yet maintained his seat, it is probable that he would have come to little harm on this occasion.

This observation taught me that I could easily play about with box-kites at an altitude not less than 1,000 feet. Later, I frequently enjoyed the sensation of hovering and "pancaking" down to within reasonable height prior to gliding into the aerodrome. These stunts were carried out with the engine running normally, but it was a finer sensation to float in the air with the engine and propeller stopped.

Mr. H. G. Hawker, a pupil of Mr. Sopwith's, had a very narrow escape from death at Brooklands at the end of June. He attempted to loop without using his engine to see how slowly he could go over the top. Unfortunately, he failed to attain sufficient speed in the initial dive, and he stalled upside down on the summit of the loop at a height of just over 1,000 feet.

The Sopwith "Tabloid" he was flying immediately went into an inverted spin, from which Hawker managed to recover but a few feet above the ground. The spectators thought he was dead, as the biplane was still in a steep dive when it disappeared from their view behind some tall trees. The machine hit one of the trees and hung in the branches for a moment or two before dropping gently to the ground. Hawker stepped out unhurt after one of the narrowest escapes in his hectic career.

Amongst the remaining pupils waiting to pass through at the Bristol School were several well-known pilots of later days. Midshipman D. S. Don, R.N., was one of them. He taught H.R.H. The Prince of Wales to fly.

Now is the time to mention Lieut. L. F. Richard, who was also making good progress. He was severely wounded during the war whilst serving with the Royal Flying Corps in France, but survived to become Chief Aerodrome Officer at Croydon. His pupil days were shared with that ill-fated officer, the late Wing-Commander Smythies, who was killed by running into an ordinary grass roller which was obscured from his vision when taking off for a flight from an aerodrome in England in 1931. After a successful war career, with much flying, which won him the Distinguished Flying Cross, it is difficult to realize that he met his end under such ridiculous circumstances.

"EVERY SORROW DOUBLED FOR THE MAN WHO WORRIES"

About this time, a very noticeable slackness overcame all the flying schools. Applications for tuition courses practically dwindled down to nil. We heard rumours that our firm was closing down the Salisbury school and transferring it to Brooklands. I paid no serious attention to these rumours until one morning, at the end of June, when I received a bad shock upon receiving the following letter from Mr. G. Stanley White, the Managing Director of the Bristol Company. On 26th June he wrote:

"Owing to the closing and the transference of our Salisbury school to Brooklands, we find that under the new arrangements our staff of pilots is in excess of the requirement, and we have, therefore, decided to reduce it. We much regret, therefore, to have to write giving you notice to terminate the engagement between us on the 31st July

With this formal letter, he enclosed the follow-

ing personal letter:
"I enclose herewith a formal letter in reference to the position you now hold with the Company. It is with extreme regret that I hand this notification to you, as during the time you have been with us, we have been extremely satisfied with your work. The recent changes in our school organization make it necessary for us to reduce the staff of pilots, and you have been chosen as one to drop out, as, of course, you will realize that of the more experienced school pilots, you are the junior.

"I sincerely trust that you will be successful in obtaining a new berth, and you may rely that whenever necessary I shall, of course, be only too pleased to give you the best of references.

I know this action hurt Sir Stanley. As was right and proper, my position was later filled by M. Jullerot, who had been with the firm longer than I had and had given valuable services.

It seemed bad luck on me, however. At this time, things were looking very black for the few good pilots who were left, as aviation firms who had struggled along against odds were only just keeping alive. But those which survived were well rewarded when the war came.

"Every sorrow is doubled for the man who worries." In this spirit I carried on until my time

expired.

There was a lot to do, as I was anxious to finish the remaining eighteen pupils. Stutt, my assistant, was greatly handicapped for teaching by being so short and only with difficulty was he able to reach the rudder-bar on the box-kites. Even when sitting in the pilot's seat, he found difficulty in reaching the joy-stick with his short arms. Consequently, I could only entrust him to give the very elementary stages in instruction.

2/Lieut. C. E. C. Rabagliati (who, with Lieut. C. W. Wilson, brought down the first German 'plane on 24th August, 1914), and Lieut. Commander H. M. Fraser belonged to this group, as

also did Mr. Harold Treloar.

Treloar, after gaining his brevet, left for Australia and later served with the Australian Flying Corps in Mesopotamia on active service. He was shot down by rifle fire and remained a prisoner-of-war in Turkey for three years, which was bad luck for such a keen airman. Still, he made up for it afterwards and became a private aircraft owner.

The list would not be complete without mention of another and, incidentally very notable, pupil, Mr. Maurice E. A. Wright (later Squadron-Leader, and a director of the Fairey Aviation Company), who, as far as I remember, could not attend very regularly for tuition. Much to my regret, I was unable to complete his instruction. He later took his ticket in the R.N.A.S. when he was a Sub-Lieutenant at the beginning of the war. He was an unusually adaptable pupil, which was not surprising considering that he had flown the Ogilvie-Wright glider in 1910.

It was now 31st July, 1914, and my engagement with the British and Colonial Aeroplane Co., Ltd. (now the Bristol Aeroplane Co., Ltd.) terminated. I made a very sorrowful exit from the old school, leaving M. Jullerot in charge.

VIII.—THE OUTBREAK OF WAR

On 4th August I returned from Hendon, where I had had an interview with Mr. G. de Havilland and Mr. Holt Thomas about a position. On my way, I read on the placards that war had been declared.

The late Sir George White, as head of the British and Colonial Aeroplane Co., Ltd., did more than any other person to bring aviation in this country to the standard it had reached at the outbreak of the war, and the memory of those old flying days brings happiness and comfort to me in the satisfaction of knowing that my work for them was of national importance, as well as in the knowledge that pupils trained by me proceeded ahead of many others.

From 1st January, 1913, to 4th August, 1914. the total output of trained pupils throughout this country, including the two Service schools, was

one hundred and forty-three.

As mentioned before there was a slackness in all the schools, but even so, my absence following my accident had certainly hindered our output of pupils. Vickers trained thirty-six, and headed the list for the first time, but only with a majority of one or two. The Brooklands School trained twenty-seven and Salisbury eight. Two of the latter had received flying instruction under me whilst I was at Salisbury.

Summing up the pre-war progress of all the British flying schools, Mr. Dallas Brett in *The History of British Aviation* 1908-14, says:

"Once again the superiority of the Bristol Company's organization is apparent. The Company had not only taught almost half of the total number of pilots trained at the British schools, but they had also established a very great reputation for sound instruction. A Bristol pupil felt that he was superior to a pupil trained elsewhere, and he was justified in feeling so. Bristol pupils found it easier to obtain employment in the industry than did those of the other schools, for it was universally recognized that Bristol tuition was the best obtainable anywhere in the world."

I had now given flying instruction to at least two hundred pupils, of whom about 142 were naval and military officers, and of whom a considerable number joined the Royal Naval Air Service to take part at the commencement of hostilities. Included in the number were Lieuts. Peirse, Blatherwick, Harvey, Bromet, F. G. Saunders, H. E. M. Watkins, Smyth-Pigott, Cull, Robertson, Fraser, Midshipman Don, Lord Edward Grosvenor, and Messrs. L. A. Strain, K.C., and Gaskell-Blackburn.

The R.N.A.S. could boast of some really excellent pilots in the very early days of war, but owing to the great reluctance of senior admiralty officers to adopt this new air arm, no conspicuous progress was marked overseas for some time. This drawback had, no doubt, its advantages in another way for there was much to be done in the shape of patrols in home and coastal waters, and escorting troopships, etc., across the Channel.

The R.F.C. Military Wing went forward uninterruptedly. The majority of my pupils were in this Service. Some were busily engaged in making pilots out of recruits by this time, as well as in testing machines, lecturing and so forth.

The R.F.C. had only four squadrons complete and ready to go on active service at the beginning of the war. They were Nos. 2, 3, 4 and 5 Squadrons. There were roughly ninety-seven officer pilots altogether in these four historic squadrons, and I am proud to be able to say that twenty-nine of them were my pupils. Many others followed with later squadrons, but the following are the names of those who went with the first four:

Majors Longcroft, Higgins, Raleigh; Capts.

Waldron, Todd, Rodwell, Spence, Joubert de la Ferté, Read, Christie, Sheckleton, Pretyman, MacNeece Foster, Shepherd (of the Gordon Shepherd Memorial Prize for R.A.F. Officers), Cogan, Playfair, Atkinson, Mills, Mulcahy-Morgan, Hosking, Roche, Lewis, Carmichael, Grey, Glanville, Penn-Gaskell, Rabagliati, Boger, and Thomson.

On the outbreak of war, the Royal Flying Corps consisted approximately of 150 officers and 1,100 other ranks, and the first British aeroplanes landed in France on 13th August, 1914.

IX.—Hendon, R.N.A.S., 1914

One day the late Jimmy Valentine, a popular pioneer aviator, and I were talking in the Royal Aero Club. War having been declared, I had offered my services to the Royal Naval Air Service, and when I told Jimmy what I had done. he said, "Why not come along now to Farnborough and put in for the Royal Flying Corps with me, in case the R.N.A.S. turns you down again?" About two years previously I had tried to get into the Reserve of the R.N.A.S. but had failed in my eyesight test, so now, at Jimmy's suggestion, and being mindful that my eyes would still block my way to the R.N.A.S., I accepted his invitation and accompanied him in his car to Farnborough to see Major Trenchard. who was in command there. On our arrival, it was pleasant to meet several of my pupils who were Staff Officers there, and thus to enjoy a very friendly reception.

After submitting ourselves for Active Service and being told we should hear in due course, we returned to London to the Royal Aero Club, where the following note was awaiting me: "Go to Air Department, Admiralty, they want to see you."

Feeling very hopeful, I set off at once for the Admiralty where Lieut. E. Maude informed me that they were giving me a commission, either as Flight Lieutenant or Flight Commander, and that I should be wanted for instructional work at Hendon and would receive my appointment within a day or so.

In the meanwhile, rather than waste time, I assisted with instructional work at the Grahame-White School, Hendon. Claude Grahame-White was made a Flight Commander, R.N.

Major Higgins was a Squadron Commander in the Royal Flying Corps at the front and he was my first pupil and officer of the R.F.C. to be wounded. The next was Capt. H. H. Shott, D.S.O., another brilliant pupil whom I had taught in 1913.

Lieut. A. C. H. Maclean was, a month after the outbreak of the war, promoted to Squadron Commander in the R.F.C. and retained as a Central Flying School instructor. I told him when teaching him to fly in September, 1912, that he would make an excellent instructor if he had the luck to get enough flying practice. I was right, but I think that, like so many others, he must gave got fed up with teaching, and later had a taste of flying overseas. I have a treasured souvenir cigarette case with the inscription, "F. W. Merriam, from his two pupils," presented to me by him and his friend, Capt. C. L. Price. They both learnt to fly at the same time.

Skene, my late pupil and able assistant instructor, was so brilliant a pilot that he was given a commission and accepted right away in the R.F.C. with No. 3 Squadron; but unfortunately he was the first officer of the R.F.C. to be killed in France, due to a crash.

The days were passing and as I had heard nothing further from the Admiralty of the appointment which I believed to be coming to me, I was getting impatient. The delay appeared to be unreasonable, so off I went to Headquarters. There was a war on and I was anxious to get on with my little bit.

On arriving at the Admiralty, I asked Lieut. Estrange Malone, an early naval flyer, if I might have an interview with the Director of the Naval Air Service, Capt. Murray-Sueter, who was good enough to see me. I had never had the pleasure of meeting him before. He was aware of my abilities as an instructor and his remarks when he received me were exceedingly complimentary. His cordiality, in fact, helped me to overcome a tremendous disappointment which he had in store for me.

He told me how extremely sorry he was that owing to my failure to come up to the Naval standard of eyesight he was unable to get a commission for me, although he realized that my services were badly needed. But there it was.

I contended that my pre-war work showed that my eyesight had never been detrimental to my work in the air, and surely at such a critical time it should be possible to cut the red tape.

When I left the Admiralty, I felt that Capt. Murray-Sueter had something up his sleeve and that perhaps, eventually, he would manage to break down the barrier, as he was obviously very disappointed at having to turn me down. Anyhow, I left for Hendon feeling sick about the whole thing.

A few day later, I received a letter from the Admiralty Air Department asking me whether I would accept a post as Civilian Instructor to the Naval Air Service. This was the best the D.A.S. could do for me. I replied immediately, accepting the offer and received, in return, a telegram

stating, "You are appointed as Civilian Instructor to R.N.A.S. and should report to Squadron Commander Porte for duty at Hendon." A move at last!

A Unique Position

I was still disappointed at not getting a commission for, as a civilian, my ambition to go out to the Front was barred; and besides, I wanted a change from instructing. Few people realized the drudgery and strain of school work. However, with the country having need, as it did then, for instructors, I swallowed my pill and settled down to it once more, wearing the blue badge with the "On War Service, 1914" inscription, which was slightly better than being compelled to show the white feather, at any rate!

I held a really unique position as the only civilian flying instructor appointed to the R.N.A.S., and receiving the same pay, allowances and privileges as a Flight Lieutenant. When I had the time to spare, I also went through the usual drills with the Sub Lieutenants. It is amusing to look back on it all now as I was envious of their possibilities of getting out to the fighting line. I was assured, however, from all quarters that I was of greater service to my country in the work allocated to me.

In the meantime, sad to say, Brooklands had been converted into an R.F.C. base. The "Blue Bird" was now a canteen and practically all the familiar figures of bygone, happy days had left. I heard that Jack Alcock, who made the first direct crossing of the North Atlantic, had presented a dismal picture seated on a petrol can, with his face buried in his hands, mourning the loss of his beloved Farman machine which had been commandeered. Oh! that I could have told him not to fret; that his precious machine had been handed over to me for school work. I am sure he would have derived much comfort from that fact, for Jack and I were good friends. Sometime after, when a pupil broke the machine up, I retained the joy-stick as a souvenir. It is famous for the number of prominent pupils of mine who handled it after it left Jack's possession. They included Warneford, R. M. Groves. J. Bird, J. P. Coleman, E. J. Hodsell, R. Graham. R. M. Field, E. Cadbury, Tom England and many others.

Alcock joined the R.N.A.S. and was appointed to Eastchurch for instructional purposes, from where he wrote to me saying:

"Just a line to ask if you ever got your tuition money refunded which you expended in learning to fly.

"When this new regulation came out about temporary officers being refunded the amount of £75, which they spent in learning to fly, I applied myself and was refused on the grounds that only people who learnt since war started were paid.

"So you see I am a bit fed up about it, as these "Quirks" have to be taught again on entry. I am just awaiting my appointment for active service and I am not sorry to get away."

We early aviators received no refund, with the exception of Service Officers, as stated earlier.

It was obvious that Alcock was experiencing the same difficulty as I was in having to teach many all over again, and it is interesting also to note that he was anxious to leave tuition work for active service.

Flight-Lieut. Beauman, who had flown from Eastchurch on 7th August, 1914, on a 70 h.p. Gnôme Caudron, was the first to take charge of the Royal Naval Air Station, Hendon, and it was during his short term as commanding officer there that Flight-Lieut. R. T. Gates was killed.

Gates had been Claude Grahame-White's manager at Hendon previous to obtaining a commission, and was quite new to Service discipline, as so many of us were. More's the pity when one analyses the circumstances leading up to his fatal accident, which occurred when he made a heavy landing in darkness.

A true story of how he came to be flying at the time has never been told, I believe, but from the highest authority I heard that one night, early in August, 1914, on an impulse and without seeking permission from the proper quarter, he took a machine up in pursuit of what he believed to be enemy aircraft. It appeared that he had seen unusual lights popping about in the heavens and strongly suspected the enemy. The lights afterwards proved to be no other than our own service observation balloons discharging signal lights. Had he reported the matter and been enlightened, he might have been with us to-day.

VARIETY IN MACHINES AND WORK

My new duties called for the best in me. I had a variety of machines with more power in them than those I had hitherto flown; namely, the 100 h.p. Deperdussin monoplane, the 100 h.p. (Anzani) Handley Page biplane, the 70 h.p. Caudron biplane, B.Es., Maurice Farmans and others. I still upheld that box-kites were the best for elementary tuition and we retained one or two for this purpose.

A number of Royal Marines from the Reserve were at my disposal for handling the machines in and out of the hangars and so forth. I had no assistant instructors, but was not hampered with the management of the school, as I had been at Brooklands.

There was also a good deal of variety in my work. Testing all the machines was my first concern, but my principal job at this time was to test numbers of probationary officers from the various civilian schools, who had taken their tickets, but many of them in haphazard ways, I may say, and far too hurriedly, even considering we were at war. Here it was my duty to comb out all those who were unsuitable for flying, or retain and nurse those who had the makings of good pilots.

Some of the civilian schools used the tractor machines for teaching but I still maintained that the training on the box-kites was far superior to that on the tractors. The difference was significant. The best box-kite pupils came from the Grahame-White school under chief instructor Marcus Manton, a well-known early aviator. Marcus and I conferred together very often regarding the good and bad types who came over to me from his school, and his co-operation was much appreciated.

Pupils trained on the tractors might easily have had their chances of becoming service pilots condemned but for the understanding and patience I exercised in taking them completely over their elementary tuition again on the box-kites. These so-called advanced pupils, with few exceptions, gave me more trouble than did the beginners, who were sent to me in numbers from the Admiralty Air Department to be taught throughout.

Ben Travers, the well-known playwright and producer, was one who came to me as a probationary Sub-Lieutenant to learn to fly, and was one of my most difficult pupils. He was very big-hearted and without fear but had not the slightest gift of "feel" for flying. He was most popular as an officer, though, and his entertaining abilities carried him far. Eventually, after a struggle, I got him through. At a later date, he assisted me with the elementary work and afterwards became a good steady pilot. We had many thrilling times together in the air. I believe it was he who was with me when a rather uncomfortable thing happened in the air.

I had just been up to about 2,000 feet to test the air and the machine, with the intention of handing the machine over to him for a solo flight, when he expressed a wish that I should take him for a flight across the 'drome, in order to show him where to land at the other side. We had reached a height of about 80 feet when suddenly I felt a lot of cables dangling around my legs and the control column. Looking over the side to see what was happening I saw the ailerons flapping about in a most alarming manner. I need hardly say that I lost no time in

switching off and getting down. By vigorous manipulation—or should it be "pedipulation?" of the rudder, I succeeded in effecting a safe landing.

"THE CRASHER"

There was a sprinkling of senior Naval Staff Officers from the Admiralty who wanted their wings. Commander R. M. Groves, R.N., who was the Officer Commanding the Naval Air Stations, was one of these. He was known then as "The Crasher," and I was relieved when he took his ticket for he caused me a great deal of anxiety. After he had had elementary tuition, I could not restrain him. His high position, too, was an advantage to him in taking up machines at his own discretion, or rather should I say, indiscretion, when he was far from being ready to do so, and when I was either not on duty or otherwise busily engaged with other pupils.

It was well known that he smashed more machines during his training than any other Naval pupil at Hendon at that time, and it was surprising that he was not killed or even injured. He was greatly admired, however, especially as he was not what we call young to take up flying. Besides his own enthusiasm for flying, he had sportsmanship and a discriminating eye for good or inferior flying. An example of this I find fitting to explain here.

Flight Sub-Lieut. Warneford, V.C., of course, needs no introduction to the majority, but I must recall that this young and gallant officer was conspicuous for his bravery in attacking and completely destroying a zeppelin in mid-air. He was the first to achieve this wonderful feat, which won for him the Victoria Cross. I have always felt certain that had it not been for Groves, Warneford would never have had the chance of displaying his skill as an airman in the R.N.A.S. and the country would have lost a brilliant airman, even though he lived only a short while after his heroic deed.

The acting commanding officer of our station, Sqdn.-Ldr. Sitwell, used to confer with me on the matter of approving and disapproving these probationary officers for confirmation, and it happened that we had divided views with regard to Warneford. Sitwell was of the opinion that Warneford would never make an officer from a disciplinarian point of view and was about to send in a report to Headquarters to that effect. I insisted that I was more than satisfied with his flying. Warneford was, in fact, a born aviator. He mastered the intricacies of flight with wonderful swiftness, and having got him over the elementary stage, I had a job to check him as he was over-confident and fearless.

Only a fluke was going to get Warneford through and I had given him a friendly tip of the situation when something quite providential happened. Commander Groves came along to inspect and to put in a spot of flying on his own account, as he very often did. I seized this opportunity to let Warneford make a good show before him, which he did. It was a wonderful show, too. The Commander was greatly impressed and made a special note in his book. I remarked to him at the time that Warneford would either do big things or break his neck. He did both.

THE SELECTION AND PRODUCTION OF FIRST-CLASS PILOTS

Sitwell and I often disagreed over these beginners. One could well appreciate his point of view, for he was a pukka navy man, drilled in a school of strict discipline. There was no subtleness in his naval arguments. He carried things too far, considering there was a war on, and his strictness actually frightened some of these boys, so much so, that it hindered their progress in the way of flying. They needed happy, unhampered minds and good spirits to concentrate on their flying lessons. But for minor offencesif they were bad enough to be termed even such -defaulters would be exposed to ridiculous punishments. Many were made to stand on the pylons out on the aerodrome for considerable periods, like penitent children put in corners. It was most humiliating, besides being unjustified.

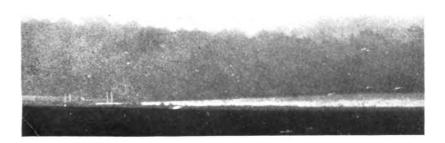
My job was to select and produce first-class pilots, and to this end I conscientiously aimed. No favouritism and every man at his true value was my motto, and in my opinion was the most important factor at that time when pilots were

so greatly in demand.

Early in January, 1915, there were rumours for the first time of an approaching aerial invasion of London. The Germans had been active in the neighbourhood of the Belgian coast, and it was not unlikely, with favourable climatic conditions, that they would soon pay us a visit. Although it was considered that any hostile attempt would be attended with great risk in view of our elaborate defensive preparations, nevertheless, we were given orders to stand by, and although our machines were not equipped with machine guns, everyone who could fly, including myself, the only civilian, was ready to take off, each with a passenger, armed with an ordinary rifle for the action. The rifles were some of those used by the sub-lieutenants for drill purposes.

This invasion proved only to be a rumour. however, but we were, from this time, kept on





Gustav Hamel's last appearance at Brooklands, just before the Great War, 1914



Starting up the 25 h.p. Anzani in the Bristol Single-Seater Monoplane in which the Author plunged into the Brooklands Sewage Farm



Lord Edward Grosvenor with the Author on a Bristol Box-Kite





The Author with a group of pioneer aviators at Brooklands, 1911



One of the Author's first pupils, Mr. H. T. G. Lane, seated on a Bristol Box-Kite, 1911

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The Author banking a Box-Kite at Brooklands, 1912

tenter-hooks expecting a raid at any time—and we did not have long to wait.

Mr. Winston Churchill, who was the First Lord of the Admiralty then, made a tour of inspection round the aerodrome sheds, and also of the machines and pupils lined up for the occasion. Sitwell introduced me to him and he became interested in the cockpit of my machine, into which he climbed.

It should be more generally known that Mr. Churchill was a very early flying enthusiast and took lessons in flying under the late Spencer Grey, a Naval pioneer aviator, some time before the war broke out.

The American Air Attaché in London, Rear-Admiral J. H. Towers, was a frequent visitor to Hendon, and he was very popular amongst us. He expressed a wish to take a flight in the Handley Page machine, and I was given the pleasure of taking him up.

I was becoming more and more busy at Hendon as shoals of pupils were being sent to me, so I had little or no time to take note of any interesting features at that period beyond the school doings. My hours in the air were ticking away like a taxi-meter and pupils grouped round me eager for their turn of tuition, reminding me of hungry youngsters round a kitchen!

I sadly recall here another of my promising pupils, Flight Commander T. N. Gerrard, who, at the time I taught him to fly, was a sub-lieut-enant. He was young and sensitive in handling and quick to learn, and soon made good use of his skill in reducing the enemy's air fleet.

During one of his air combats, when he was flying a triplane, the enemy's fire destroyed practically every particle of his top plane, leaving him only a biplane, to all appearances. He got away with it, and had many other narrow escapes.

He had a close tussle alone with about ten aeroplanes on one occasion and brought down one. The enemy machine did a series of rolls from about 3,500 feet, then fell, after which "Teddy" made his marks on another which had dived on to one of our machines from behind. With another scout to help, he shot it down also; then by clever piloting, landed his own machine safely after it had been badly damaged by bullets. He was awarded the D.S.C. for this tricky bit of work. His uncle, E. L. Gerrard, was a well-known pioneer naval aviator.

Instead of the red, white and blue identification rings on the wings of our machines which we have to-day, we had, at the beginning of the war, square Union Jacks which, in the distance, could easily be mistaken for the Germans' identification cross. As a result, our machines were often fired at by our own anti-aircraft guns. We were pleased when the modern roundel was employed and our allies adopted the same design.

Two more interesting pupils at this stage were Commander F. C. Halahan, who was not of tender years, but showed more aptitude in the noble art of flying than did some of the younger ones, and Lieut. James Bird, who was one of the best to teach to fly. He died only just recently.

It had been a very successful time for me at Hendon and I was pleased with the work done there. I heard also from good authority at the Air Department that my work had given great satisfaction in that quarter.

X.—CHINGFORD R.N.A.S., 1915-1917

We were now moving to new quarters. Chingford, a distance of about eight to ten miles, as the crow flies, was to be our centre. I was given the job of flying the school machines over. They were of many different types. One of them was a Handley Page, and I believe the only one of this particular type left in the country at that time. It much resembled a German Taube in the air, with its swept-back wings. Before setting course in this machine I needed to get sufficient altitude in order to avoid anti-aircraft guns, in case we were taken for a Taube. My engine was not pulling too well and the atmospheric conditions were very bad and bumpy.

After wasting about twenty minutes hovering over the aerodrome trying to attain a good height, I pushed off across country, flying considerably lower than was safe. When we were nearing Chingford, my pupil attracted my attention to puffs of smoke in the distance and in the direction of the small arms munition factory, about three miles to the left of Chingford aerodrome from the angle at which we were approaching it. I at once altered my course as the firing was obviously intended to reach us, and side-slipped into the aerodrome on the other side. When we had landed we found that we had caused quite a stir amongst them there, too, as many of the officers at the new station were quite new to the appearance of this particular Handley Page in the air. So much for the days before aircraft recognition schools and radiolocation!

It was a treat to move in to Chingford. The whole of the aerodrome was at our disposal, unlike Hendon, where we were so congested with the many civilian schools and experimental machines being tested there. School work was now able to be carried on without any obstruction from aircraft other than our own. On the other hand, the flying ground itself was not as large as Brooklands, and, instead of the sewage farm and railway embankment, we had now

adjoining the aerodrome a large reservoir with streams and swamps to contend with.

I could not understand why such a place had been chosen for a flying ground. I remember the first time I landed on it myself when bringing the first school machine over, how surprised I had been at these conditions. But it appealed to me in the same sense as did Brooklands. It had its advantages for training by compelling beginners to land in restricted areas.

Here we became very much under strict naval discipline. All the trainees came under regular naval training, apart from their training in the air.

At Hendon, with so many civilians strutting about, I had not felt so out of place in holding a civilian position—in fact, I never seriously thought about it; but at Chingford I was the only civilian instructor on the station—I should say, "on board"—with scores of uniformed officers and ratings. Was it to be wondered at that I felt somewhat like a fish out of water? I was nearly always in my flying kit, so did not look as conspicuous as I felt, but there were times when I pioned the officers in the mess and other gatherings where my "mufti" made me feel rather out of it. I was in the Service in practically every other way, even to saluting the Colours at day-break and at sunset.

Our first commanding officer at Chingford, a charming man and most beloved by all, was Flight Lieut. C. Pulford, who was lent to the R.N.A.S. from the Royal Navy on 18th December, 1914. He had applied to learn to fly in 1912 and had been ticked off by his captain for entertaining such a crazy idea. Flying, the captain said, had no future and would lead to no advancement. Pulford persisted, however, and obtained his ticket at the Central Flying School in January, 1915. He was taught to fly by Major Waldron, a 1912 pupil of mine.

During Pulford's brief stay of about six weeks at Chingford, I remember him not only flying by day, but also standing by all night to chase Zepps, which, God knows, was strenuous work. He was leader of that wonderful pioneer flight in 1925 from Cairo to the Cape.

A very amusing incident occurred during Pulford's stay at Chingford. One day when he happened to be watching the running-up of the 50 h.p. Gnôme engine in my box-kite, one of the cylinders flew off and shot through the air into the side of a wooden hut. The stark naked figure which came rushing out through the door was an ancient mariner who had been in the process of having a bath in the hut!

As time went on, I was relieved of such duties as superintending the handling of machines. Strictly speaking, my duties were now confined to

instructing and testing machines, which was quite as much as I could do with so many pupils coming along. I was actually flying from early morning till late evening, taking rest only when the weather was absolutely unfit for flying, which was not too often, for it was no longer necessary to wait for calm days for school work as in the earlier days—except in the case of the very elementary box-kite pupils, of course. I rarely got out of a machine except to get into another or to stretch my limbs.

Introduction of Instruments

We had a greater variety of machines even than at Hendon. Avros, Blériots, Bristols, Bullets, Shorts, and others which were more suitable for the elements owing to greater power and other improvements.

Instruments were at this time coming into use on various machines, and pupils had to be schooled in them, but instruments, like most things, needed improving upon as they were not always accurate. In fact, they often failed completely, so that it was still very necessary to be able to fly without them.

One of my pupils at this time was Commander C. L. Lambe, R.N. His cool head and strong nerve overcame the difficulties experienced by the "not so young" when learning to fly, and

made him a good, steady pilot.

After I had been at Chingford about a couple of weeks, a telephone message came through from the Admiralty saying that I was wanted at once at the Air Department. "A fine thing this," I thought, "in the middle of work, too. What could be wrong? I couldn't be getting the sack for flying too much, surely?" I could not remember having done anything wrong, unless it was that I differed too frequently with the C.O. in my views regarding the flying of the pupils, and now, perhaps, I was up for reprimand! This trend of thought took possession of me until I reached the Admiralty.

Capt. Murray-Sueter received me and told me how pleased he was to inform me that he was now able to give me my "well-earned" commission as a Flight Lieutenant, and thanked me very much for the good work I had put in as a civilian instructor. He told me that my eyesight test was to be waived. I thanked him suitably and assured him that I should continue with my work in the same thorough and enthusiastic way. He said that it would not be long before I should get further promotion for the valuable work I was doing

Needless to say, we had a grand celebration in the mess that night. Everybody was delighted. It was champagne for the officers and beer for the men!



The following week congratulations appeared

n *Flight* :

"It is gratifying to see that the real hard plugging work done by those of our pilots whose names were familiar to all our readers in the days before the war, is meeting with recognition in high quarters. Following on the appointments of Lewis Turner and C. Howard Pixton to commissions in the R.F.C., it is pleasing to note from the official lists that that other old-timer—F. Warren Merriam—has been given a commission as Flight Lieutenant, R.N.A.S. The announcement will be received with satisfaction by all his friends, and they are legion. Congratulations!"

Now that I had risen to the dignified estate of Flight Lieutenant, I was in a position to administer my duties in a more Service-like manner!

We were all tremendously thrilled at that time to hear of Sub-Lieut. Warneford's single-handed attack on the zeppelin in mid-air. He had accomplished this brilliant achievement after chasing the zeppelin from the coast of Flanders to Ghent, where he succeeded in dropping his bombs on to it from a height of only one or two hundred feet. One of the bombs caused a terrific explosion, which produced such atmospheric disturbances that Warneford's machine was turned completely over. He looped-the-loop involuntarily, but was able to right his machine. He afterwards saw the zeppelin lying on a roof, where it was totally burnt out.

Having seen this he pushed off, but one of his tanks had been pierced by gun-fire and he had to land in hostile territory. He at once set to work to empty the leaking tank into the second tank and resumed his flight amidst a hail of bullets from the German troops who had run up in the meanwhile. He was on the ground about ten minutes. It was a miraculous escape. mentioned earlier, he was awarded the V.C. and also the Cross of the Legion of Honour. The horror of the news of his untimely end, but a few days later, came as a severe shock to us all. When flying at a height of 700 feet with an American journalist as passenger, Warneford's machine, in making a sharp right-hand turn, was struck by a gust of wind and side-slipped, and not being strapped in their seats, both pilot and passenger were thrown out. The passenger was killed on the spot, and Warneford died on the way to the hospital.

THE LIGHTER SIDE

Returning to the lighter side, or rather the humorous side, as it strikes me now. I was one day preparing to take off with a pupil for tuition on a pusher. There being no mechanic available at the time, the pupil got out to swing the propeller. I was sitting in the passenger seat, and with difficulty—for I have rather short arms—I was stretching from this position to switch on, which I did immediately the engine started. Simultaneously, the machine lurched forward, rolling the pupil over the tail-boom as it went. He had carelessly left the throttle too far open and at this instance, the switch refused to function. There were no means of stopping it from where I sat. but I managed somehow to scramble over into the pilot's seat, and ruddered just in time to steer clear of several machines which were scattered about on the ground.

I was now in a position to reach the throttle but it was no use throttling down for, having no wheel brakes, my machine simply could not pull up in time to avoid the river. The only thing to do, therefore, was to open the throttle full, in an endeavour to clear the river. I did this with success and managed to gain sufficient height to do a circuit and land in the ordinary way.

A sequel to this occurred one afternoon at a later date when Ince, a young Canadian pupil, went up solo in one of the J.N.4 Curtiss machines ("Jennies").

After bird's-nesting for the best part of twenty minutes amongst the trees at the far end of the aerodrome, he decided to land, and just staggered over the hedge into the aerodrome, landing with his propeller stopped. Not wishing to make a mechanic run the necessary mile to start his propeller, he got out and swung it himself, completely forgetting to close the throttle.

For the first time, I should think, in the history of the Curtiss engine, it started right away, revved up, and the machine, having knocked Ince over, proceeded to take off on its own, and to fly down the middle of the aerodrome at an altitude of about 10 feet. Half-way down the aerodrome, it did a gentle right-hand turn, with exactly the amount of bank I myself would have recommended, and flew over the brook! It next made straight for the Armament Store which was full of bombs and fuses, and caught the store fair and square in the middle. At the moment of impact I suppose there must have been about 100 people on the aerodrome, each of whom immediately threw himself flat on his face. Nothing, however, went up except the machine!

Flying was still in its infancy and good air mechanics were comparatively few. They were a keen lot of young chaps and although they did the best their limited experience allowed, it was not wise to rely on them too much, nor was it fair to do so. I used to lecture them on the thoroughness of their work and remind them how we were to a great extent at their mercy in the air if they had left a job half done. I often took the mechanics concerned up when testing engines and machines—a good practice!

Hundreds had flown with me—doctors, padres, warrant officers, and nearly everybody on the various stations had at their own wish flown with me when I could spare the time, either at testing, on photographic work, cross-country flying or the like. I often meet people, and receive letters to this day, from those who claim to have flown with me, but I cannot, of course, remember all of them.

One very senior pupil of the Chingford days was a Captain W. L. Elder. "Daddy" Elder, we called him, though not to his face! He left me with some pleasant recollections of his training. He was slow and needed a lot of patience, but he realized this and was most considerate. He was anxious not to obstruct the usual school routine, having in mind that the younger men were more important and had to be got through first. He left it to me to fit his tuition in at the most convenient times, and would ring up frequently to know if or when he should come along. As a rule, a Service car and driver would bring him. We eventually arranged that he should come along in the evenings, about half-an-hour before dark. When he was almost ready for his ticket, he expressed a wish for cross-country flying, and we used to set off, allowing comfortable time to reach Hendon, with a little to spare for me to return alone to Chingford. His car would be waiting at Hendon to take him to his home from there. This arrangement was made to save time, for he had tuition on the way and usually a landing or two when we got there.

One evening we left it rather on the late side before starting, and when we were half-way we ran into a very thick mist just as darkness was setting in. Matters could not have been improved had I decided to return to Chingford. Besides, having flown so many times to and from Hendon, I was well acquainted with landmarks, special guides of mine being a signal box and other objects on the railway which I could now only just discern. We were flying dangerously low, dodging tree tops and houses, when at last I discovered we were over a field. I did a circuit over it to try and find out the nature of the ground and decided to make an attempt at landing, which, by a stroke of good luck, I managed without any damage. My pupil was very relieved, as also was I! I did not know whether he realized the danger we had just undergone, as I did, but anyhow, we were not on the ground a minute before some fellows came up to us and we asked if the aerodrome was near. "Yes, mister, only a couple of fields over there," they told us, pointing in a certain direction. Being so near, Capt. Elder and I thought we had better hop over to it, and so we started up again, but by the time we got to it it was totally dark. By now I realized how foolish I had been to chance it, but started studying the faint lines of street lights and began to piece them together like a jig-saw puzzle. At last, I was able to work out Edgware Road and hugged it at as low an altitude as I dared. Then soon I recognized the familiar Handley Page works on the right, and a little lower down on the left, the aircraft factory at the corner of Colindale Avenue. We flew straight in to the aerodrome just over the tops of the hangars, coming again to Mother Earth without misfortune.

It was in the early days of the war or the lights would not have been so helpful. As it was, they were very dim through the mist and that was why I had to fly low enough to see them. Meanwhile, Capt. Elder's driver was waiting for him, and the C.O. at Hendon, Flight Commander Busteed, had telephoned to Chingford only to learn that we had been gone a considerable time. Great consternation was caused as I had a "Brass Hat" with me!

My pupil was so delighted with his adventurous trip that he insisted on taking me to his home for supper. Capt. Elder took his ticket in August, 1915, and was later sent to command an important Station in France.

It might occur to some people that it was rather absurd for these senior officers to take up flying. I can assure them that it was all-important, because somebody had to command and, after all, these experienced, long-service officers were best fitted to do so. Moreover, it was necessary for them to fly, too, in order to have a perfect understanding of the possibilities and difficulties. They were greatly to be admired for their pluck, and I respected their initiative tremendously. They were good sportsmen.

It was then, and has since been many times, agreed upon that in those days it was no light job to teach them. I may say that the strain and responsibility of doing so was more than doubled for me owing to their high standing at the Admiralty. The thought of any misfortune befalling any of them during the pupil stage naturally caused me a great deal of anxiety.

A certain very high-ranking officer has since remarked that all these officers certainly owe much of their success in the Royal Air Force to me. This compliment paid in all sincerity by one so highly esteemed is most gratifying.

It was, I believe, with one of these senior

officers on another cross-country training flight that we were again trapped in a quickly-overtaking mist in the Thames valley where anti-aircraft guns were situated, and we were actually over the top of a defence station for a tense ten minutes or so trying to pick up a true course.

The anti-aircraft people could not see us and were thus tantalized by the sound of an engine over them which caused them to take quick action. They rang through to the Admiralty and the latter got through to our station to enquire if any machines were up. Our C.O. knew that I was the only one but could not think what I was doing over in that direction and recommended them to fire, in view of the enemy raids which were just beginning to be much talked about. When we arrived back at the station unscratched, we were amused to learn what had been going on.

"HIDE AND SEEK"

A number of interesting stories of hide-andseek in the mist have been told, but where is there a more heroic and appealing one, especially to the imaginative schoolboy, than that which Major F. A. de V. Robertson, V.D., a notable Australian air-journalist, wrote some time back of one of my early war-time pupils, the late Major R. S. Dallas, D.S.O., D.S.C.? Here is part of the story:

"He is believed to have accounted for 50 enemy aircraft. He was a magnificent pilot and a most daring scientific air fighter. This was the time of the last general German advance against the 5th Army and on April the 14th, 1918, Major Dallas, with three Captains (an unusual formation for a very special piece of work) reconnoitred the junction of the 1st and 2nd Armies, where the situation was obscure.

"Early in the mission, the Major was wounded by machine-gun fire from the ground (the weather was bad and the S.E.5A.'s were flying low), but he carried on until he was wounded a second time, when he successfully regained his aerodrome.

"He seems to have made light of his wounds, for on May 2nd he dropped a booby-trap on a German aerodrome in the form of a parcel, marked 'If you won't come up here and fight, herewith one pair of boots for work on ground. Pilots—for the use of.' He then hid in the mist until Germans collected round the parcel, when he attacked them with bombs and machineguns.

"Major Dallas was fighting with three triplanes when he was shot down, dead. His promotion to Wing Commander did not reach him in time before he was killed."

·15th May, 1915, was the occasion of the first

night zeppelin raid over London. The unpreparedness of our country to meet and cope with these enemy attacks was the subject of a public outcry.

The best machines we had in this country at the time for the purpose were the B.E.2c's, which were the general favourites amongst pilots, but they were not efficient for the job owing to their lack of speed and climb. They were, however, very easy machines to fly, and were reliable for remaining in the air for a considerable time.

In addition to the absolute necessity for the production of aircraft good enough to oppose our enemies, there was the great need for better night landing facilities. We suffered a tremendously high percentage of fatalities, injuries and crashes through primitive lighting arrangements and bad organization at that time.

A MEMORABLE NIGHT

It was a good thing Germany did not possess as many zeppelins as she was generally supposed to have, otherwise she would have done far more damage than she did to London, while the authorities were still falling out over the question of who should have charge of London's air defence, the Army or the Navy.

Having taken a personal part in the first night raid over London, as well as in others that followed, I can say that these were the most dangerous and nerve-racking ordeals which we

were called upon to perform.

On this memorable night, orders came through that all available pilots and machines were to stand-by in readiness to go up. Our instructions were that should we encounter a zeppelin and fail to hit it with our rifles or hand grenades, we were to ram it! It sounded easy enough! I recall the supreme spirit and courage of our little crowd of pilots at Chingford—and they were not the only ones, of course—but I naturally speak of them for they were pupils of mine and I was in their company. The fact that they had very limited experience considerably concerned me for I knew that the most experienced pilot—let alone these youngsters, who looked upon the thing almost as a sport—faced great danger, if not death.

It was not compulsory for me to go, for having been hard at it all day with tuition work and testing, I was supposed to be off-duty, but nevertheless I was prepared to take my part at any time.

There was a toss-up as to who should fly with me. Sub-Lieut. J. S. Morrison won and was my observer on the 100 h.p. Deperdussin monoplane.

This particular machine was a brute for landing in a small aerodrome by day, let alone at night, and was dangerous even in the most capable hands. Night flying on it far from appealed to me as a forced landing would more than likely mean death. The majority of the other machines available were of the school type and the most suitable of these were picked by the others for the job.

In addition to the gun and grenades carried by Morrison, I had a revolver which was lent to me by a pupil, Sub-Lieut. Thompson. This revolver I have now. The police allow me to retain it as a war souvenir.

These notes from my diary bear testimony to

the tricky nature of this flight:

"There was a thick ground mist hanging about the aerodrome as we took off. We proceeded to the vicinity of Central London, cruised around her for about two hours, altitude 8,000 feet, but could not sight a 'gas bag.' Lamp on dashboard failed—could not see petrol, oil or altitude gauges, rev counter or compass. On return, took bearings by the stars. The Thames was the only thing faintly discernible except scattered, dim lights. God knows how I got near the 'drome. Didn't realize I was so near it—came down low enough to try and pick up familiar landmarks. Worried about petrol getting low. Been flying for long time. Goggles oiled up, and when wiping them they blew away. Got the wind up about landing. At last saw a flare through the mist—hugged this a few minutes, flying at about 100 feet—tried to observe obstacles round 'drome and rather imagined I saw a blackish pool which I thought might be reservoir. Eyes bunged up with oil from engine, couldn't see now -only flare faintly. Had to chance it. Shouted hard to Morrison for his observations; he couldn't hear, so cut off engine and made for flare, going by feel entirely. Flattened out what I estimated to be 5 feet from ground, losing flying speed, and pancaked like a duck on a pond. Was surprised to find myself on 'drome. Poor Morrison, deaf as a block, but happy to be on terra firma. I felt sorry for him sitting there while I did the work."

Thus ended a fruitless errand. We might just as well have stayed at home. The zepps had already dropped their bombs and pushed off, perhaps before we had even started.

It was discovered that our axle was only slightly bent, this being caused by the flat landing I purposely made to check the speed of the machine. I was temporarily blinded by the oil and had to be treated by the medical officer.

The other pilots and observers were not as fortunate as we were. None of them returned to the aerodrome. Some crashed and were injured. Douglas M. Barnes was killed, but his observer. on this occasion, Ben Travers, miraculously escaped with slight injuries.

This ghastly night-landing business was literally as well as figuratively, a nightmare. All those who went as observers had need for strong nerves: their risks were, of course, equal to those of their pilots.

While we were running risks on these beastly night expeditions, still helpless to get at close quarters with the enemy, it is well to remember some of the distress caused to our people. The raiders flew so high in order to prevent, as far as possible, the danger of damage or destruction from our anti-aircraft guns. The darkening of the Metropolitan area, together with the height at which the aircraft travelled, prevented them from discovering the exact position of the places they had designs on, with the result that damage was exclusively, except for one or two chance shots, on property and persons unconnected with the conduct of the war.

With the machines we then had, it was not

possible to overtake the zepps.

Incidentally, just before the R.F.C. took over the flying for the defence of London, I had been piloting Commander Brock whilst he experimented with his (then) well-known "Brock Bullets." I offered to use these, or any others, when an air raid was expected. I suggested that I should patrol in a B.E.2c and lie in wait for the enemy; there was no hope of catching them otherwise, but much to my disappointment, I was not allowed to try this.

The next we heard was that Capt. W. Leefe Robinson, V.C., who was an R.F.C. pilot, had put my idea into practice with a B.E.2c and successfully brought down a zeppelin at Cuffley.

Herts, in flames.

A zepp raid was expected over London on the night of 31st January, 1916. Major Penn-Gaskell (a 1912 pupil) who flew with the first Squadron out to France and had not long returned, was in command of a London Air Defence Station and received an order on the night in question from H.Q. to send an airman up. The night was foggy and dangerous for flying. Penn-Gaskell, knowing the risk would be great. went up himself rather than send an officer with little flying or night experience. This devotion to duty cost him his life when he crashed on landing.

I record this short account as tribute to his heroism.

There was a good deal of jealousy between the two air services. The Navy certainly had the best pick of machines, perhaps because it was the senior service.

Although I held a commission in the R.N.A.S. I had equal interests in the R.F.C., inasmuch as the majority of my pre-war pupils were in that service.

From time to time came gratifying and wonderful accounts of the early war work of the R.F.C.

In my Press Album I note an extract from an interesting article written to the *Daily Telegraph* by Philip Gibbs from the British General Headquarters in 1915, which shows the fruits of the good work of a large proportion of my pupils:

This, at least, can be fairly said. That unless we had had a number of efficient air pilots at the outbreak of the war who were able to raise and train a large body of young enthusiasts with extraordinary rapidity during the war, the work of our armies in the field would have been sadly handicapped, and our gunners especially would have been like blind men fumbling in the dark compared with the present accuracy of their range-finding. Of the courage of these men of the Royal Flying Corps it is impossible to write too much praise. Scores of times I have seen them in flight above the German lines, with shrapnel bursting all round their planes, so that they seemed to be sailing to certain death. They escape, by their own skill, or by just the fluke of luck, time after time; but it is not work which looks more dangerous than it is—a spectacular exhibition with little risk.

"Take the German losses over a period of a few months, and the risks of the air service in war are apparent. The official returns from the air squadrons alone were, in June of this year, 53 killed, wounded and missing; in July, 43. I believe they are as nothing compared with the enemy's losses. But the skill of our men in manœuvring and the cool courage with which they engage in aerial duels do not eliminate the hazards of their adventures. The number of hair-breadth escapes, even in one month's work, would make a long and thrilling record."

Gibbs goes on to tell interesting stories reflecting on the excellent work which was in progress on active service.

"A typical episode happened on November 4th. A flight commander and a second lieutenant were engaged in artillery observation when they were attacked by a huge hostile pusher machine—that is a machine with its engine and propeller behind the wings—closely followed by three tractors—or machines with forward engines and propellers. Our officers immediately opened fire upon them, using one drum containing the cartridges of the Lewis gun. The pusher was hit and

flew off at once, followed by two others. The remaining one engaged our aeroplane, chased it in full flight, and then, while it was manœuvring for position, dived underneath its wings and fired as it passed. The flight commander was wounded in the right arm and the petrol tank was pierced.

"Two other flight officers of ours on patrol duty saw the machine mentioned above closely pursued by a German monoplane, and they made a steep dive towards it like a swooping hawk. The Germans saw their danger, and making a swift turn, flew straight beneath the wings of the British aeroplane, passing at about thirty yards below. Half a drum was fired at them but they turned again and spiralled three times round our men, while both machines were dropping rapidly. Suddenly, the Germans decided to make off, and flew away at a great pace, but they were followed at about eighty yards distance by our machines, which fired the remaining cartridges in the drum. Some of these shots were aimed true. The German monoplane turned righthanded and banked steeply, then toppled upside-down, and plunged to earth just inside our lines. The pilot and observer were both killed."

"A CLOSE SHAVE"

"On the same day, in a different neighbourhood, two of our flight lieutenants had a very close shave, and in spite of the great spaciousness of the sky, found themselves in a tight corner. They were making a reconnaissance as a matter of ordinary duty, when a German Albatross came out of the clouds and passed them at a range of 200 yards. They were on the qui vive for an attack from this particular bird, when suddenly they heard firing behind them. They turned sharply to the right and discovered another Albatross. At the same time, as if two were not enough, a hostile aeroplane bore down swiftly with a continual rattle of bullets from its machine-gun. The two flight lieutenants got their Lewis to work and drove off the monoplane, but the Albatross manœuvred round and round in a most sinister fashion, and for nearly twenty minutes fired continually at our machine. Fortunately, their shooting was not so good as the skill of the British officers in manœuvring out of range, and after this long duel the hostile aeroplanes swooped away, leaving the British machine alone, and untouched.

"Two sergeants in one of our flying squadrons had a perilous time when they were dropping hand grenades and *flèchettes* (steel arrows) over a town occupied by the enemy. A German monoplane gave chase, and one of our men was hit by a bullet in the hand and had his face grazed. When reaching out for his rifle, he was wounded

in the other hand. The pilot made a steep dive towards our lines, closely followed by the enemy, and at this critical moment he was hit by a bullet in the leg, and another shot put the engine out of action. For a moment or two the situation may have seemed hopeless, and death certain, but with steady nerves, the pilot succeeded in landing within our lines, and a British biplane appeared in sight and drove off the enemy."

It would be appropriate to mention, at this stage, some noted pupils who were undergoing training. Their names became well-known in

aviation in later years.

Flight Sub-Lieut. L. E. Goble had an exceptional war record and was the first to fly round Australia with MacIntyre, his observer—also an old pupil.

Only recently I read of a flying veteran, Flight Sub-Lieut. Rae, who was later chief test pilot to

Boulton Paul, Ltd.

Like most other beginners who were over the popular flying age, he required rather more

attentive teaching than usual.

The Houston Mount Everest Expedition had for its leader Air Commodore P. F. M. Fellowes, D.S.O., at one time aide-de-camp to H.M. King George V. He was a Lieutenant Commander when learning to fly at Chingford. He used to come to our station for the purpose of lecturing the young officers on naval matters, and to kill two birds with one stone, he usually took these opportunities to fit in some flying tuition.

Flight Sub-Lieut. H. G. Brackley also passed through my hands. He became Air Superintendent of Imperial Airways, Ltd. It would take many pages to write of his various flying adventures but I should like to quote the following from "Old Flying Days," by Major C. C.

Turner:

"In one of the attempts to fly from Cairo to the Cape I took part, accompanying Major H. G. Brackley, Captain F. Tymms, Mr. Knight and M. Banthrop on the attempt in an 0/400 Handley Page. We were going strong when, on the third day from Cairo, just as we had decided we might make Khartoum in one flight from Assuan and were flying at a height of 8,000 feet, suddenly the tail began to rock violently, the centre of trouble apparently being about half-way along the fuselage. Brackley stopped the engines and the rocking ceased. He put them on gently, and it immediately resumed, and thereafter, although he immediately throttled down, it continued. He had no rudder control, and his aileron control was almost gone. Happily, he could operate the elevator. He had a heavy task in keeping the wheel in his hands. Thus we came down, gliding for more than fifteen minutes, and in every

second of that glide we expected the next would see the complete disintegration of the machine. Each of us was so convinced the end had come we were quietly resigned. But by a miracle the machine held together. Brackley, however, had been unable to steer into the wind and we touched sand and boulders with a big side drift, with the result that the machine was partially wrecked, finishing on one wing and with its tail sticking up well out of reach."

They were all very lucky to have got out of this remarkable difficulty. It speaks volumes for Brackley's skilful and cool-headed handling to have brought the machine down.

During training, I used to get the pupils to make descriptive sketches of the machines they were learning on, as it was instructive. I have just come across an interesting example which is none other than that of Flight Sub-Lieut. J. F. Horsey, who became an outstanding pilot of Imperial Airways, Ltd., and who has probably flown more hours than any man. He was one of my quickest and most brilliant pupils. How different he must find it to fly huge air liners these days, which, despite most weathers, maintain their full flying schedule.

As I turn over the numerous sketches, it is difficult to pass on without commenting on all of them, but it is impossible now. It seems to me that many of these Flight Sub-Lieutenants would have made first-class draughtsmen had they missed their vocations as some of the country's best airmen. For instance, Flight Sub-Lieuts. A. V. Bowater and R. C. Gardner would, I am sure, have passed with honours in this category.

A brother of the pioneer, Robert Blackburn, came under me at Chingford. He was Flight Sub-Lieut. N. W. C. Blackburn. He did excellent work as O.C. of the R.A.F. Officers' Training School at Brough.

Some year ago, R. E. Dean, who belonged to the same "aviary," jogged my memory about Blackburn's effort on an Avro. The machine having stalled at a good 1,000 feet immediately over the reservoir, proceeded to nose-dive and stuck the engine fully five feet into the bank of it, remaining in this position with its tail in the air, after having concertina-ed both the cockpits. Everyone on the aerodrome rushed out to pick up the pieces, and when we got there, there was no sign of Blackburn. We naturally thought he had been pitched into the reservoir, and were taking steps to get in to fish him out when a yell went up from the road, a few hundred yards below, and he was seen walking back to the aerodrome, having walked down the other way!

The reservoir could unfold many stories. It

became necessary later to moor a motor-boat on

it, in readiness for any mishaps.

The first serious accident to happen at Chingford involved the very terrible death of one of our young probationary flight officers. This boy had finished his elementary course on the boxkites and was flying solo on an Avro when, apparently, something went wrong with the engine and he was unable to get into the aerodrome, although he made a splendid effort to do so. Unfortunately, he was obliged to land on a very rough piece of waste ground covered in potholes and ruts, and the sudden impact with one of these caused him to crash badly and the machine was instantly ablaze. Just at that time, I was in the act of landing on the aerodrome with a pupil. My propeller was still going when the horror of the thing caught my eye. Simultaneously, and without dropping my pupil, I turned the nose of my machine round in the direction, and motioned to all the officers standing around to make a rush for the burning wreck. It was surprising how quickly they got on the spot. I was first, having flown, Flight Lieut. Cecil Murray the next, and a trail of pupils following closely behind. There was a river dividing them from the scene of the accident and this they swam. Alas, for all our hurry, we were helpless to do anything. It was impossible to approach the machine, the heat was so terrific. It was maddening in our helplessness to listen to the screams of that poor chap who was imprisoned in the awful inferno.

We ladled water from the river in flying helmets and coats in a desperate effort to smother the flames, but it was all futile, and we waited until we dared to get near enough to wrench the wings from the fuselage. When we managed at last to do this, the pilot fell through and Murray and I managed to pull him clear. His features were quite unrecognizable and he pleaded with our Medical Officer, Dr. G. D. Ferguson, to be put out of his misery. We had swamped him in Castrol oil from the tank of my machine to try and ease his agony. I never thought it possible for a person to survive the shock from burning for so long. He lingered quite an hour and was conscious to the end. Murray and I were pretty badly burned about the head and hands.

I shall always remember the effect that that accident had on the other young officers. They were all lads, and this unhappy affair completely knocked the stuffing out of them and they all made themselves scarce. The mechanics were still standing by the machines awaiting orders. Seeing the state of affairs, I went straight to the O.C., Commander Chambers. I told him what had happened and asked what I should do about it. He replied that he would leave the matter entirely

to my discretion.

He knew it was my wish to carry on with the school work just as if nothing had happened. I proceeded to have all the pupils lined up, then I lectured them on the necessity for courage, if they wanted to be fighters. I explained to them how we pioneers had witnessed many of our colleagues' fatalities, some our closest friends and pupils. But even after this lengthy sermon only a few expressed keenness to carry on flying. The others, numbering between thirty and forty, still felt bad about it and I set to work taking them up one by one on a fast machine, giving each three or four minutes in the air, with some stunts. This did the trick, and I have learnt since that it was well worth my trouble, for most of them turned out to be the finest war pilots we produced. Many of them have since reminded me of the incident.

During most of the time I was stationed at Chingford my wife and family lived in the same vicinity, our house almost adjoining a very large cemetery. It was my custom to fly over my home at the conclusion of my morning and evening work, and give my wife a signal that she might expect me home some twenty minutes later. I was always accompanied by a pupil on these flips, and one day I took a new one with me. It was his baptism of the air and although he did not suspect it, I was closely observing him on this his first flight, to find out how he felt about it. He was perfectly ignorant of my attachments near the cemetery.

Circling a few times over the tombstones and at the same time waving my hand, had a seemingly uncomfortable effect on this youngster. Judging by his expression, I thought that he looked anything but happy. When we got down, I questioned him, but could not gather quite what he thought of his first flight so I asked him to make remarks about it in his log-book. Next day I saw the entry, which explained the reason for the apprehensive look on his face when we were over the graveyards. He had obviously believed that I took him over there to forewarn him that "there's to do or die," for the description he gave in his log was, "enjoyed my first flight with Flight Lieut. Merriam immensely. Circled several times over a cemetery where he made signs. Then we flew back to the aerodrome and landed safely." The signals I had made to my wife were mistaken by him to signify something quite different!

The same pupil nearly put an end to me shortly after this when I was sitting behind him giving him landing lessons, at which he made good progress. We were descending at a speed of over 60 m.p.h. and had flattened out at about 10 feet when, with unaccountable suddenness, he jerked

the control-column forward, causing the machine to nose-dive and strike the earth with such terrific force that I was tossed right over the elevator like a shuttle-cock and pitched head first on to the ground. I was completely knocked out and do not know to this day how my neck was not broken. The pupil himself was jerked forward with sufficient force to break his safety-belt, but his fall was checked by the struts of the machine. This sort of thing happened quite frequently, but I had never been completely tossed out before!

It would appear from the following article, which was published in the American magazine, Liberty, on 9th June, 1928, a copy of which was sent to me by an old friend staying in the U.S.A., that I had a bit of my own back on my pupils sometimes:

"LUCK ON THE WINGS' by A. Roy Brown.
"In the 'Red Knight of Germany,' recently published in *Liberty*, an American airman told of being pitched out of a 'plane in a dive, but of landing back on it, fortunately for him, before reaching the ground. I remember a case that matches it.

"This happened at Chingford, a training drome in England. A man named Merriam was an instructor there. His method with cadets was to make em or break em quick. Not that he was hard-boiled. No, he was merely an efficiency expert.

"'Got a sensitive backbone?' he'd say to a quick student, as he pulled on his gloves.

"'Hope so, sir-why, sir?'

"'If you haven't, you can't fly. Get in!'

"He never wore goggles. He was very shortsighted and claimed he could not see any way.

But he could fly.

"On this particular occasion his pupil was Tubby Wallace. They went up in a Grahame-White two-seater (this was early in the game)—an animated box-kite that looked like a bird-cage on wings. It was a pusher type, with a little nacelle instead of a man-sized fuselage, in which the instructor sat in front, with the quirk behind. They went up 4,000 or 5,000 feet. Tubby had forgotten to fasten his belt. He did not seem particularly interested. Old Merriam was a crank. He did not know that Tubby's belt was loose, but he did know that he was not very impressed with the lesson.

"Without warning, to jolt him, Merriam whipped up and over in a sharp loop, and suddenly, as they flung over coming down, Tubby felt himself leaving the cockpit and starting a vertical dive on his own. He was pitching over the bow earthward. That was nasty. He became interested right away. He got busy trying to clutch something. As he shot over Merriam he

managed to wrap his legs around the instructor's neck. He gripped and hung on with his feet locked, nearly choking him. But it would have taken more than that to have fussed old Merriam, who could fly without looking. He pulled out of the loop, glided down, and made a perfect landing with Tubby's legs still around his neck and Tubby's head hanging out over the front of the nacelle. It was fortunate for Tubby that the machine was a pusher and not a tractor with the propeller in front, or he would have been guillotined.

"It was lucky that he had strong legs, or he would have broken his neck. It was lucky the pilot was Merriam, or the pair of them would have crashed. And it taught Tubby to fasten his

belt. . . ."

I wish I could think of exciting stuff like that! Of course, the machine was a box-kite and I am sure no one, even in a nightmare, has attempted to loop one. Actually, what I did was to execute a steeply banked turn.

Brown, who is now acknowledged to have brought down the famous German ace, Baron von Richthofen, was, I am proud to say, also a pupil of mine. The Prince of Wales himself decorated him with a bar to his D.S.C. in recognition of his gallant victory.

He hailed from Canada and on his return to that country, being somewhat of a national hero, he was no doubt sought after to contribute

articles for the press.

Dealing with von Richthofen's last fight, it was interesting to learn that another "Chingfordite" (also my pupil) was on the spot at the time. He was Flight Lieut. M. A. Harker, R.N., and he tells us:

"Fifteen of us, flying Sopwith Camels, were doing a squadron patrol and were joined shortly before the flight by two S.E.5's from an R.F.C. squadron. At about 10,000 feet and six miles the other side of the lines, we encountered Richthofen's circus, numbering twenty-three Fokker triplanes. As in all so-called dog-fights, we each found our own enemy to tackle. Most of us were soon down to about 3,000 feet, where May, a newcomer to the squadron, found himself below the rest of us—a fatal mistake often made by beginners. Richthofen, spotting him, made a bee-line for him. Roy Brown, his flight commander, seeing his protégé in difficulties, went after them, and put one burst into Richthofen. shooting him through the heart and the head.' . . ."

Brown's little tale, I see, draws attention to my vision. It seemed apparent amongst all my pupils that my eyesight was not up to scratch, but it is only recently that I realize how much I was talked about with regard to this deficiency. Some time ago, another pupil, Capt. C. Vaughan, reminded me of a little joke which happened during his time at Chingford.

OPTICAL DELUSIONS

One day, whilst I was busily engaged on my usual rounds of instruction, I landed and taxied up to re-fuel. The mechanic who had gone to fetch the petrol, which at that time had to be conveyed in two-gallon tins, seemed an unduly long time in coming, and with the pressure of work waiting, it was not surprising that my impatience grew to boiling point. As I reached this crisis of aggravation, a figure loomed slowly into my vision, carrying what I took to be two petrol cans, one in each hand, and at close range I emitted a few remarks of undoubtedly unbecoming English. "What the hell do you mean by crawling along like that?" I shouted. Imagine my feelings when I discovered that instead of the mechanic with the petrol, my words had fallen on the ears of an Admiralty official who had "come aboard," carrying a couple of just attaché cases! He gave me a glare which was quickly replaced by an understanding smile as he realized my error.

Everybody is subject to optical delusions at times. My vision was not bad to the degree as was generally supposed by my pupils, and I will tell a story which proved to be a good sight test and contradictory to the yarns spun about my short-sightedness. One day, I had gone up to test a machine before school work started. It was winter and a fresh layer of snow covered the aerodrome. After some minutes of circling round at about 800 feet, I noticed two dark figures in the middle of the 'drome. They appeared to be writing something in the snow and I tumbled to it at once that they were probably writing a message for me. Eventually, with very little difficulty, I deciphered the words, "WHEEL OFF." At that, I at once looked under my machine and found that, right enough, one of my wheels had fallen off. I circled over the writing at a low altitude to make it known below that I had seen the message, and when coming down to land I flattened out at about five feet, stalling the machine, and landing on one wheel with a gentle turn—somewhat like a top ending its spin—and coming to rest finally without any damage at all to the aircraft. It was a lucky ending to an incident which might have meant a bad crash for me had not some smart fellow conceived the ingenious idea of writing in the snow. To him I am very grateful, as I am for my visual acuity—which, by the way, improved with age!

Our Chingford Air Station could boast of a most amusing and interesting fortnightly magazine called "Chingflier," edited by its founder, C. M. Wightman, with W. M. Connah as secretary. The first edition appeared on 28th October, 1916, and it is interesting to note that C. G. Grey, of *The Aeroplane*, wrote a special article for this issue. I cannot refrain from copying it, firstly because it revealed the characteristics of its author and secondly, because in my mind it is absorbingly reminiscent. I am glad to have discovered that he shared my views with regard to the landing skill of pilots trained at

Brooklands and Chingford.

"So the R.N. Air Station at Chingford is to have a paper of its own, is it? Excellent idea! As a brother editor, I wish the blue-penciller of my latest competitor every kind of luck. His job is probably less worrying than mine but then he has to do an honest day's work before he begins his editing, so probably the hard work balances up for the privilege of not being worried by censors and inventors and lawyers and enquirers and such-like comic people. But wait till 'The Chingflier' gets thoroughly under way, and the editor will wish he had never been born. I don't know what his job may be during the day whether he has to look after engines, or the rigging of aeroplanes, or just books, but as sure as aeroplanes fly, he will find his daily work interfered with by people who threaten to have his blood after working hours on account of what he has said, or has allowed someone else to say, 'The Chingflier.' He is not likely to be threatened with libel actions, it is true, but he may receive terrible hints about the horrid things which will happen to him next time he goes ashore. However, as he is by now in all probability, fairly well accustomed to defeating the Chingford mosquitoes, he is likely to be able to tackle with success any argument raised by anything or anyone else connected with flying.

"Years ago, when people staggered painfully round an aerodrome on a 50 h.p. Gnôme boxkite, the prophets used to say that British pilots would eventually be the finest in the world, because by the time they had acquired sufficient skill to defeat the British climate, they would be clever enough to fly in any weather anywhere. The prophets were right for to-day one reads of R.N.A.S. pilots flying in North Sea fogs, in a temperature far below freezing point; or over Mesopotamian deserts in a heat of 120 degrees in the shade, with the water boiling out of the radiators of its own accord at 8,000 feet or so; or over the great lakes of Central Africa, with the probability of landing on a crocodile or a hippopotamus; or over German 'Archies' in Flanders, with a gale blowing them out to sea. And they all do it successfully because, after the British climate, nothing can surprise them.

One might add that British aerodromes have much to do with the skill of the pilots. The man who can land with certainty at Brooklands or Chingford, or some of the other British aerodromes, may be considered as knowing something about his job, and he would never have learned as much if he had been trained over the vast, uninterrupted plains of France or Germany.

"The British editor learns his job in much the same way. By the time he has learned to dodge the censorship and the law of libel, and personal violence from his readers, he may reckon he knows something. Therefore, I wish the editor of 'The Chingflier' just enough trouble to teach him to be careful, without crashing his craft through colliding with the C.O. or falling foul of the Laws of the Navy as interpreted for aerial use."

In its pages there are references to pupils who later came before the public eye. To name a few, there were Ben Travers (playwright), L. Irving (composer, artist, and son of the late Sir Henry Irving), and Davies, who became the celebrated Ivor Novello, who wrote that famous war-time song, "Keep the Home Fires Burning."

I could fill several volumes with my activities at Chingford. Life was then at its fullest for me where work was concerned, but of course, there was a war on. Scores of people were passing through my hands fully-fledged and doing well.

Scores and scores still followed.

When I look back, it is difficult to realize how I got through with it all. Here is an extract from one of the many letters I received from pupils of these busy days. It is from Capt. H. H. Square, who became Aeronautical Advisor to the

Spanish Government:

"When one thinks of it, at the very least 50 per cent. of the R.N.A.S. pilots who saw active service in 1914-15 must have been trained personally by you or by instructors under you (themselves originally your pupils). The number of 'duds' that you threw or sifted out at various times must have been fairly high to the saving of much money by the Admiralty; but compared with all the pilots you passed out, the number of 'duds' was certainly practically nil. . . ."

So much of this success was happily attended by extraordinary good luck. There was an immunity from fatalities for one long spell, which

seemed too good to last.

The D.A.S., Capt. Murray Sueter, had learned that the R.F.C. was turning out pilots very much more quickly than we were and I was approached with a view to speeding things up a bit. There was at this time, of course, a tremendously increasing demand for pilots over the other side, and it seemed that we could not turn them out fast enough. But with regard to the R.F.C., as I

pointed out, they were working too quickly to be efficient, with the result that they would suffer for it later. It was therefore agreed upon, at my own earnest request, that I should be allowed to carry on in my same old style, but with one or two extra helpers.

It was soon acknowledged that my prediction was right. Quality stood before quantity in pilots. The R.F.C. had a great number of casualties at about this time. This applied also to some of the R.N.A.S. Training Stations. It was truly a scandal. The country lost many a brave fellow before he ever got a chance to have a smack at the enemy through insufficient instruction, especially in landings, before going out to the Front.

I was told by one of my pupils that a number of Flight Sub-Lieutenants from some of our stations had arrived at a certain front, presumably ready for air fighting, but it was found that they were quite unfit and had to be instructed

all over again out there.

It was still very difficult to find pilots with the essential gifts for teaching, but I had later an admirable little band of assistants, who had originally been my own pupils, namely, Flight Lieuts. Ben Travers, J. S. Mills, D.S.C., C. H. Hayward, G. H. Jackson, J. C. Mitchell, Cecil

Murray and L. Morgan.

I believe it was under the auspices of the Canadian military authorities that a film was taken, and I still have several pieces of the reel. It showed the training of the Canadian pilots and work on the 'drome generally. A friend wrote many years later telling me that it was showing at Tottenham and Edmonton, and that I had a picture all to myself, showing the number of hours I spent in the air, which constituted a record at that time.

The total number of pupils who passed through my hands up to the end of 1916 was well in the region of 700, and I was still going strong. A very progressive year indeed and much good work was achieved overseas by its output.

Most of my pupils continued to write to me from time to time and some of their letters make amusing reading to look back on. Here are a few extracts which come from pupils who were either graduating for, or already putting their

skill into, more serious account:

"... am now flying Bristol Bullets.... I climb and climb until I think they're going to hit the sun. They're a bit tricky taking off and after landing, and they're so sensitive they're like flying a feather... All your pupils seem to do well but me; still, I'm not a stunt pilot, I know, but I've never even broke a wire or burst a tyre since I started so I'm not so bad. I couldn't stand B.Es. though. They flew me

instead of me flying them. I never went up without visions of spinning nosedives, etc., conjuring themselves up very vividly in my mind."

". . . Since leaving Chingford I have been to Calshot, H.M.S. Vindex, Felixstowe, and am now at the Seaplane Base at Dover en route for Dunkirk, I hope. . . . Seaplanes are alright but I think land machines are nicer. Not quite so wet, you know! I was out when Knight got captured, but did not fly as two of us were taken as spare pilots. I have since corresponded with him in Germany and he says he was forced to come down in the middle of a snowstorm owing to the rocker arms of the cylinders of his 225 Sunbeam breaking. Strikes me as funny as Read also had the same trouble and was captured.

"Knight did some jolly good work in the night raid on Zeebrugge, but lost his way back and landed at Dover instead of the ship at Dunkirk. I believe young Horsey was in the Campanie and in the Jutland scrap; he joined that ship the same day Knight and I joined the Vindex. . . . "

. . . I am now through with Shorts and am flying F.B.As. and shall shortly be on Sopwith Scouts. I cannot say I care for Seaplanes as much as land machines. One has not the same "feel" with them and in consequence one is taught to fly by instruments a great deal. . . . Very sorry to hear the sad news of Harvey, Oliver and Walker. . . ."

"... I was ordered to German East Africa. This is a good spot where the natives promptly called us in their naïve way, 'The Great Bird Which Drops Iron,' and I had an amusing time for some ten months amazing lions and causing giraffes to think that they had 'got 'em again'. . . I photographed crocodiles basking in the sun on the Falls of the White Nile. I also had a Ford car in which we made trips into the bush! And the saddest moment of my life was the afternoon when I shot an ostrich which rushed with long strides across my line of fire when I was aiming at a Konioi. The bird had such large, hopeless, reproachful eyes, I could have wept over it. . . . '

I have chosen to publish these extracts because when reading between the lines, they reveal something of the boyishness (for mere boys a lot of them were), so abruptly and sadly checked by a great serious game commanding them; something of the obvious youthful joy and satisfaction it gave them to inform me, their old "school master," of their progress; and because of the

quaintness of those early flying days.

Quoting from the very interesting book of a late Royal Naval Air Service Officer, C. F. Snowden-Gamble, entitled "A Story of a North Sea Air Station," some wonderfully exciting true stories of many of my pupils are well worth

recording:

"At 3.30 a.m., in thick weather, H.12 N.8666 flying boat left the station with Flight Lieut. Galpin (in command and navigating), Flight Lieut. Leckie (pilot), Chief Petty Officer V. F. Whatling (wireless telegraphic observer) and Air Mechanic O. R. Laycock (engineer). The Brock, Pomeroy, and Buckingham ammunition and four 100 lb. bombs, in addition to the wireless telegraphic apparatus, were carried. On leaving the Air Station the flying boat was steered on a course for the Terschelling light vessel, Leckie piloting. Later, Galpin relieved him, and when at a distance of 80 miles from Great Yarmouth, 8666 ceased W/T communication to avoid discovery. Thirty-three minutes later, they sighted a zeppelin dead ahead about 10-15 miles away and end-on. At the time, the flying boat was cruising at a speed of 60 knots at a height of 6,000 feet, and the airship appeared to be 3,000 feet lower than 8666.

"What happened afterwards is better told in Galpin's own words: 'We dropped three of the bombs to lighten the ship at 5 a.m., and Flight Sub-Lieut. Leckie took over the wheel again. C.P.O. Whatling went aft to the rear gun and I went forward to the two Lewis guns mounted parallel in the bow. The zeppelin turned north and then north-east exposing her broadside, and I concluded she was coming south-west when we first saw her, and had now reached the limit of her patrol. We were then about two miles astern of her so increased speed to 75 knots, descending to 5,000 feet. She seemed as yet unaware of us, probably owing to our background of dark fog and clouds; but when we came within half a mile of her she put her nose up and seemed to increase speed. We dived at her at 90 knots, coming up slightly astern at 3,800 feet, where we levelled out to 75 knots. In this position we overhauled her on the starboard quarter about 20 feet below the level of the gondolas. I opened fire with both guns at 50-yards' range and observed incendiary bullets entering the envelope on the starboard quarter slightly below the middle. After a few rounds the port gun jammed, but the starboard gun fired nearly a complete tray before jamming also. We were then 100 feet from her and turned hard a-starboard while I tried to clear the starboard gun. As we began to turn I thought I saw a slight glow inside the envelope and fifteen seconds later, when she came in sight on our other side, she was hanging tail down at an angle of 45 degrees with the lower half of her envelope thoroughly alight. Five or six seconds later the whole ship was a glowing mass and she fell vertically by the tail. C.P.O. Whatling, observing from the other hatch, saw the number L.22 painted under the nose before it was consumed. We also saw two of the crew

jump out, one from the after-gun position on the top of the tail fin and one from the after gondola. They had no parachutes. . . ."

"So ended the career of L.22 which, according to German accounts, had taken part in eight raids on this country and 41 war cruises.

The envelope was burnt off and the bare skeleton plunged into the sea, leaving a mass of black ash on the surface from which a column of brown smoke about 1,500 feet high sprang up and stood. . . ."

These two brilliant early war-time pupils, Leckie and Galpin, both of whom rose to important positions, are credited with many more thrilling exploits, but on this special occasion they had the distinction of being the first to destroy a zepp by the aid of a flying boat. Galpin has since told me that his first baptism of the air with me still leaves a vivid impression on his mind, and, in his own words, reminded me that:

"It was very late on a January evening, and the light had almost gone when my turn came to go up with you for the first time in an old box-kite. My only consolation when I saw it was that several other people had gone up in it and come down safely before me. I perched myself up, sitting on a cross strut and clinging on to two others in front of an engine whose only control appeared to be an old electric light switch by our hand, and with some nervousness saw the ground slipping away. We went off over the sewage farm that lay on the west side of the Chingford aerodrome; and banking (as it appeared to me extremely dangerously) on our right wing, you gave me a full view of what lay beneath us. This over, you turned off to the churchyard and banked over this on our left wing, so that looking anxiously over my left shoulder down between the planes, I could see the tombstones glimmering in the last of the twilight. When we got safely back to the aerodrome I felt that I had been warned!"

Strange the effect the sight of the tombstones had upon all pupils for I have gathered from many of them since that they believed that this was an intentional stunt of mine. Of course, it was nothing of the kind, but just merely my custom, as I have mentioned before, to fly over my home which was adjoining the cemetery.

Returning again to more interesting extracts from Mr. Gamble's book, I could write of so many excellent deeds of others (such as E. Cadbury, B. D. Hobbs and R. F. Dicky), in destroying zepps, if space permitted, but I must include the two following stories quoted therein. Here is one of the narrow shaves Cadbury had when flying a Baby Scout seaplane, similar

to the one I later flew on coastal patrol:

"Returning from a patrol, his goggles suddenly shifted across his eyes, momentarily blinding him, with the result that he dived into the sea at a speed of 120 knots. Despite his severe bruises and cuts he was flying again within a week, jocularly remarking that his size saved him. "For instead of the machine breaking me, I broke the machine!" (Cadbury was a six-footer.)

"An H.12 flying boat from Felixstowe Air Station (with the C.O., Lieut.-Colonel Robertson, and Major J. O. Galpin on board) was shot down as a result of an action fought with five enemy seaplanes from Zeebrugge air station. The flying boat was forced to alight at sea (due to the damage inflicted on the port engine) and was totally wrecked, although her officers and crew were saved after they had been clinging for nearly eight hours to the keel of the upturned hull. This action was distinguished by the sportsmanship shown by the enemy. As soon as the H.12 was on the water one of the German machines alighted, taxied up to the boat and hailed Lieut.-Colonel Robertson, and told him he was near our coast and asked him whether he would rather wait and trust to luck that some of our machines would pick him up. Lieut.-Colonel Robertson thanked him, but elected to cling to the wreckage of the H.12, whereupon the German pilot took a photograph of him, waved a cheery farewell, and flew away back to Zeebrugge.

Lieut.-Colonel Robertson, it will be remembered, came under my wing before the war. Major J. O. Galpin, who is referred to in the foregoing story, must not be confused with my

own pupil, C. J. Galpin.

We had a few American volunteers who termed themselves "Canadians" and, of course, we were getting batches of real Canadians along, too. They were a very fine lot of chaps, and took to flying with such gusto that it was a job to hold them back. Take Leckie, who came across from Canada. His wonderful work led him to high service rank. In the pupil stage, his initiative was perfectly obvious to me. He had exceptional alertness and sensitive touch. He was not lacking in any quality whatsoever which would befit a first-class war pilot.

Then there were Roy Brown, Squadron Leader J. A. Glen, Major R. F. Redpath, and K. F. Saunders, D.S.C.; also many more of the same old vintage. Long since that day, Redpath and others have written to me from across the ocean asking such questions as: "Do you still eat apples while flying in the early mornings?" and "Do you remember putting the wind up us

by letting go of everything in mid-air and waving all fours at the same time?" My answer to the first question is, "Yes, I do still eat apples" (they are often Canadian, too!). This apple question necessitates an explanation for there was the hint of greed about it! I always believed in the old proverb "an apple a day keeps the doctor away" and I regularly ate a couple every morning while flying before breakfast.

To the second, I do remember all about this, but here again my pupils have laboured long under a wrong impression. It would appear that I was guilty of having behaved like a raving lunatic by letting go of everything and waving "all fours" in the air for the purpose of putting the wind-up my pupils. Never in my life! This was merely my own way of starting my circulation going after sitting so long cramped and exposed to the bitter cold, in the old bird-cage machines. To all who knew me then, and had any doubt, I hope this explanation will suffice!

Whilst talking about this part of the world, I had the pleasure of training Flight Sub-Lieut. H. V. Reid, early in 1915. He was the first war pilot from Newfoundland (Britain's oldest colony). Reid became a very fine pilot and did splendid war service. He belongs to an interesting flying family, for besides his two airmen brothers, his sister flew her own machines and was highly esteemed in aviation circles. She became well-known to the public for competitive and long-distance flights, and is the wife of Mr. Alan Butler, another prominent aviator with notable flying records, and the Chairman of the De Havilland Aircraft Co., Ltd.

I remember how Chingford seemed to become a very convenient spot for pilots flying cross-country to develop engine trouble on Saturday afternoons and evenings! I think the close proximity to London had something to do with this, and the temptation of a Saturday evening in Town. However, if my memory serves me rightly, the C.O. "rumbled" this and immediate examination of engines became the rule!

Also, I remember an advanced pupil who went out on solo but overshot his distance, consequently losing his direction. After circling over a reasonable-looking piece of ground, in

case he had to land, and trying to pick out his direction, he noticed someone below wildly waving a long pole with something on the end of it. This eventually lured him low enough to discover that it was a man waving a butterfly net. The pupil at once got the idea that he was over a lunatic asylum and decided that the lunatic had hopes of capturing an outsized butterfly in the net! The pilot at once knew which way to pick up his bearings and hopped home quickly. He found out later that he was quite right in believing that he had been over an asylum for it turned out to be one near Fairlop.

Another important branch of my work in these hectic Chingford days was testing. Having just come across a chit of paper dealing with this, I am reminded of another old-timer, Major C. R. Abbott, who took his ticket (No. 101) at Brooklands in 1911, and who, at the Admiralty, became responsible for the transportation of aircraft. We were very often in touch with each other, for it fell to my lot to try out and report on many new machines prior to being passed by him for various places abroad. When fresh machines came to our station, it was usual for me to fly them first and find out their characteristics and oddities and to familiarize myself with such. The war, of course, resulted in a great speed-up in aircraft production and evolution about that time. Necessity introduced many grand improvements and new types. All the same, the good old mother of invention with the ever-pressing demands had not the time to spend looking into the possible shortcomings of her offspring as in peace days and therefore often produced a bright-looking specimen with freakish mannerisms, quite unsuspected until they were put to severe test in the air.

For the reason of their brief stay in England, few will remember the French Horace "Shorthorn" pushers. They were, however, long enough with us to have left behind very unpleasant recollections. One or two arrived at Chingford for school purposes, and for a trial flight in one of these I took with me an assistant instructor for experience. We both got that all right!

(To be concluded)

Flashback to 1940

A PERSONAL DIARY

It is a perfect summer morning. Not a visible cloud mars the blue of the sky. Trees and hedges are shining with that almost audible brightness of fresh verdure noticeable in early May. In the distance the bells of Tring church are ringing for morning service and the air is noisy with the singing and chirping of birds; thrushes in the grove across the road, sparrows and chaffinches mostly in the garden. Round the lawn is a multi-coloured arc of tulips, flaming magnificently in the sun.

That is the scene from my window. Yet not so very far away, at this moment of time and on this lovely summer morning, hundreds of thousands of men are engaged in destroying one another with all the resources of the human

heart and mind.

It is a most strange and puzzling thing that human beings who, by and large, conduct their affairs and their lives on rational lines and do not ordinarily behave themselves as ferociously as the wilder animals, should yet indulge so frequently in this pursuit of war. It is scarcely to be believed that anyone, anyone of normal temperament and intelligence, believes that war is a good thing. Its results we well know—and have in our own lifetimes had convincing proof—are destructive of those things which human beings value and enjoy: are destructive of those conditions in which we can live comfortably and happily. War impoverishes us; both its immediate and its ultimate effects bring misery and hardships in overwhelming measure.

What is the explanation? Do we, as a species, periodically divest ourselves of that reason and intelligence which we normally possess? What impulse impels us to these inexplicable outbursts

of mutual destruction?

I think that those who say that "the people" hate war-hate, that is, the actual process of armed conflict as distinct from the inevitable consequences which follow it—are mistaken. The argument that the great masses of peace-loving people are thrown unwillingly into war by the evil plottings of a few unscrupulous leaders anxious to further their own selfish interests and ambitions is not a convincing explanation. Nations could not habitually evolve leaders whose impulses and instincts are altogether different from those of ordinary men and women. The ordinary European man does not absolutely hate fighting. He does not instinctively hate fighting as he instinctively hates having teeth extracted. He is not morally shocked and outraged by the thought of war. There must be a sense in which he actually likes it, or at least is stimulated by the prospect of it. Nothing else can really explain the fact that he indulges in warfare so frequently and so readily. It is easier to raise large numbers of volunteers to fight in a war than to serve as missionaries.

No doubt the mistake we make is to believe that we are "civilized"—in the sense that we are no longer swayed by the natural primitive instincts associated with savage and barbarous peoples. In as far as war is a barbaric undertaking we must still be largely barbarian. There I believe lies the explanation of this otherwise insoluble puzzle.

18th May, 1940

The midnight news last night had in it a faint but chill undertone of disaster. Or so it struck me. I do not often listen to the midnight news, so perhaps the associations of the hour gave the announcements an unusual significance. Whatever the reason I thought for the first time: Suppose we are defeated in this war? I thought this not as a remote speculation but as an actual contingency. It was a strange and disturbing experience. The mood passed almost at once, but it has made me realize that defeat, in great wars, comes to those nations which first succumb to these emotions—for I think they are emotions. That is the sense in which it is most true to regard modern war as waged between nations and not only between their armed forces. National spirit. national morale, is the decisive factor.

Attempts to foresee the course of military operations are notoriously difficult—perhaps an impossibility. Quite late in the summer of 1918 the British G.H.Q. had no inkling of the impending German collapse. It is curious that Haig, who had so often been mistaken, was the first to sense the coming victory. In the last few months of the war he attained the stature of greatness. He has been severely criticized, no doubt with justice, and he was certainly not an inspired military genius. But whether he was fundamentally wrong in the conceptions which led him to engage the British armies in the Somme battles and Passchendaele must remain uncertain. They have been described by his critics as savage defeats redeemed only by the valour of the men who fought in them. But I have observed that the German generals who opposed him did not take that view. They do not claim the Somme as a great German victory. In the winter of 1916 what they most dreaded was



a renewal of that terrible onslaught. We must save our armies, they said when urging the policy of unrestricted U-boat war, from another battle of the Somme.

But I was going, as a matter of interest, to forecast the course of the present battles. I expect the Germans will make big salients in our line and perhaps force us back into Northern France to the neighbourhood of the old battlefields. Gradually we shall stem the onslaught; gradually its impetus will exhaust itself. The position will be temporarily stabilized and there will be a pause—both sides too exhausted to press a large-scale offensive. Both sides will have to draw upon their resources and gradually we shall grow stronger. During this period the Germans will probably bomb Britain and France; though, unlike us, they seem to have developed their Air Force mainly as an Army Co-operation instrument rather than for long-distance independent air action. Petrol and air power must be the decisive factors, and if we can stabilize the front in the next few weeks our greater resources must tell. I am still inclined to my original guess that the war will end in the autumn of 1941.

My first reaction to Gamelin's "Conquer or die" Order of the Day—which I expect will become historic*—was uncertain. It seemed to suggest that there is a positive virtue in being killed -whereas there must be many circumstances when it is wiser to withdraw and kill some of the enemy tomorrow. But now I see something stark and ruthless in the demand. It expresses, not in heroics but with awful realism, the claim which the nation makes on the individual soldier. Go, it says, and die. That is what your country commands you. What a strange conception it is, this of the national community: strange and, in the last resort, all-embracing. Future ages, which may well point to nationalism as the curse and madness of our era, will fail in perception if they do not also recognize something magnificent in it. That for which a man will coolly die merits more than condemnation. That, I suppose, is the pity and the tragedy of this senseless carnage. Senseless, that is, from any natural and humane and compassionate point of view. Courage, loyalty, self-sacrifice: those are the virtues of war. If only it had any real point. In war it is a disadvantage to have and to value the qualities of an intelligent and cultured man. Yet as things are we must fight to survive.

Future generations must condemn the governments of the nation for their actions in the years On a different plane, the future will surely condemn as desperately weak the inaction and blindness which, since 1933, allowed Germany from a position of helplessness to forge unmolested and uncurbed a weapon to destroy the life of Europe. That after years of clear warning we were so unprepared in September, 1938, that we had to submit to the Munich settlement convicts our governments of criminal negligence. For that reason I can never hold Chamberlain in high esteem. If we had been strong enough to fight in 1938, as we deemed ourselves to be in 1939, how much more advantageous our position would have been.

The Abyssinian embroglio was another example of astonishing ineptitude. To have allowed Italy to achieve her ambition and to have retained her as an ally against Germany would have been at least intelligible, if immoral. To have done neither and incurred the odium of both was folly.

Anyhow, the next few weeks may be seen as a milestone in history.

19th May, 1940

Another lovely Sunday morning. The paragraph of description I wrote last week would stand equally for today—except perhaps that a brisker breeze is blowing and, at the moment of writing, the drone of an aeroplane has taken the place of distant church bells.

The news, since I wrote yesterday evening, is that we have withdrawn behind Brussels and abandoned Antwerp: not it seems under enemy pressure (the fighting they say has not been heavy in this area) but to conform with the movement of the battles in the south.

There the Germans have gained some more ground but they do not appear to have made notable progress: the situation may be slightly more favourable to them but it is the same situation. And there are suggestions, the news says, of some slackening in the intensity of the mechanized attack. One might almost say that in this situation any news that is not disastrous is favourable.

^{*} But who remembers it now?

25th May, '40

It has been a week of uncertainty interspersed, one must confess, with moments of anxious fore-bodings. At the end of it the Germans are in Boulogne, the Allies back in Arras and the out-skirts of Amiens. The Germans have been passing their mechanized units through a narrow neck roughly between Arras and Amiens into a sort of widening bag beyond. One assumes that the issue of this battle depends on whether the Allies can close this neck and prevent a further breakthrough elsewhere. And one would suppose that is worth a mighty effort. . . . Surely the Allies can control the resources for a powerful counterstroke. Our actual losses cannot have seriously affected our military strength.

In the air it is a contest between quantity and quality. It is clear that both our machines and our pilots are measurably superior to those of the enemy. It is reasonable to suppose that the Germans cannot for long face losses in the neighbourhood of 500 aircraft a week if we can continue to inflict them. And they must be prepared to sustain great losses in any concentrated air attack on Britain. It is perhaps doubtful whether they will invite such further blows to their air strength while the military situation remains indecisive.

26th May, Sunday

A cloudy day turning to rain in the afternoon. We went to church at 11 o'clock. I have never seen a church more crowded—for the National

Day of Prayer.

I have been thinking about "Virtue"—that is the best word I can contrive for what I mean. We believe that we are fighting to preserve those elements in life which we might call the Christian virtues (though they are not, of course, confined to Christians): compassion, mercy, integrity of mind, respect for others. The German Nazis deny these virtues. They replace them I suppose by different ones: racial superiority, strength, success (it is difficult to express the Nazi creed in terms of virtues). Anyhow, they preach and inculcate in their people a doctrine opposed to the virtues we accept. They recognize standards of excellence in conduct different from ours; antagonistic to ours.

Now the point is: on what are these virtues based? Are they merely conceptions of the human mind? If so, the "virtues" of the Nazis have as valid an authority as ours. Or are our virtues in some way "extra-human," deriving their validity from something essential in the quality and constitution of the universe? In other words are we fighting for our conception of virtue and our way of life against hostile forces which threaten to destroy them? Or are we defending

verities and virtues which have an existence of their own apart from our belief in them?

One result of the last fortnight's happenings is that we have begun to fight this war in earnest. We have stopped trying to win the last war over again and have been forced to begin trying to win this one.

1st June, 1940

A week that began with anxious forebodings, moved to the sickening brink of disaster, has ended in a glorious uprising of the British spirit. An extraordinary change seems to have come over the country in the last two days. The magnificent rearguard action of the B.E.F. and the French, and the successful evacuation of troops from the Dunkirk beaches has stirred the nation like a trumpet. One breathes something intangible in the air. It is the old unbreakable fighting spirit of the last war.

The capitulation of the King of the Belgians was a strange thing. There is something pitiable in this decline from the heroic to the mean. . . . It is embarrassing to contemplate such a sad spectacle. . . . What a tragic fate for the son of a great father.

There is no doubt that the British and French have achieved a magnificent feat of arms. By gallantry alone they turned defeat into victory. The material loss seems nothing beside this victory of the spirit. It must plant in the German mind the small fatal seed of disillusion. After all their effort and reckless losses, it must begin to appear that the end of the war is no nearer. Final victory still eludes their grasp. For how long can they continue to strain after it?

The essential result of this Flanders battle, now nearing its end, is that at last we are roused to fight. For months it seemed almost as though the Government hoped to win this war without fighting. We are bound to win in the end, they seemed to argue, so why make bloody sacrifices for a result that must come of its own accord? It was perhaps the Gamelin creed, nurtured behind the Maginot Line. There was insight in Hitler's reported answer when someone once asked him what evidence he saw of France's decline: "The Maginot Line." There is no doubt that both Britain and France were reluctant to fight, to endure the awful losses of war. But neither Hitler nor Mussolini grasped the underlying cause of this aversion to war, which was not decadence but a belief that war was a criminal folly and victory a Dead Sea Fruit, not worth the loss of one young man's life. But Hitler has himself changed that. He has shown us that the defeat of Nazi Germany is worth any sacrifice. He has forced upon us a belief in war.

Our greatest strength lies in the fact that Hitler cannot endure a defeat. Probably he will try to use his occupation of the Channel ports to assault England. We must stand up to that. Our main forces are still intact. We must bring his air offensive to a standstill. It is a war of spiritual endurance.

2nd June, 1940

Sunday again, and once more like yesterday a glorious day. We may well think of yesterday as a second "glorious first of June" in two senses.

It has been one of the most delightful Mays that I ever remember. When it has been fine it has been supremely fine, and when it rained it rained fully and generously and warmly, and then the clouds melted and the earth rejoiced in its refreshment. Now June has come and we are entering upon a new phase of summer, as a story unfolds itself page by page. The trees and hedges are losing that extreme vivid vibrant green of new uncurled leaves and are beginning to assume the full-blown stately richness of high summer. . . .

Yes, this has been what I might describe as a Shakespearean May—compounded of blossom and sun and youthfulness. The red may-blossom and the chestnut candles have been more than commonly abundant. And by contrast against what a dark background we have seen it.

As I get older I grow more and more in love with the sights and scenes around me, the recurring drama and passion of the seasons, the harmony of the natural world. I have always loved the English countryside in which I lived as a child. But it was not until I went to India that I knew how much I loved it: how essential it was to my well-being. I was ill when I came home and, staying in the country, strength seemed to come to me out of the air. I was like a gasping fish put back into the waters of his cool river.

Yesterday an old Service colleague and his family came over to see us. We had tea in the porch and after a while fell to watching a colony of ants carrying away bits of egg sandwich and the limbs of a large deceased spider. Their determination and tenacity of purpose were amazing. Two in particular had hold of each end of a long lump of white of egg and, methodically and with precise co-ordination, they manœuvred it down the perpendicular bricks of the porch step and across the rough stones of the path, each in turn swinging the other round, just as two men might have moved a heavy piano across a room and down a difficult flight of stairs. Another, singlehanded, took the best part of an hour to wriggle the large leg of the dead spider over crags and chasms to the distant nest. We must have presented an odd spectacle squatting on our haunches or lying in the grass watching with interest the transport system of these determined insects. I suppose ants are insects. I suspect from the way they blunder straight into obstacles and perform prodigies of effort to surmount them when a slight detour would have saved them all the trouble, that ants are blind, or at least that any sense of sight they possess is not geared very effectively to their intellectual mechanism. What they feel or touch or smell stimulates at once an intelligent response, but what they see, if they see at all, seems to do nothing of the kind. I think it is probably wrong to regard "instinct" and "intelligence" as two distinct and separate faculties. Instinct is a sort of specialized intelligence, but still intelligence of a high and valuable order. Perhaps one of our human troubles is that our intelligence is insufficiently linked to those activities which are naturally good for us. Perhaps the Nazis realize this and have attempted to remedy it among the Germans. It is a pity that their notions of what is good for them are so distasteful to others.

Do I hate the Germans? I don't find that I do, in any active sense. What would I do to them if I had the power? Render them innocuous to the rest of mankind and forget about them. They are an astonishing people. Perhaps they are the logical product of the modern cult of efficiency—a cult I have always suspected can be carried too far. Efficiency is after all inapplicable to so many of the better and pleasanter forms of human activity.

Do I feel that we shall win this war? Nów assuredly I do. As a leader writer said yesterday, our lads have shown the mettle of their pastures. It is that mettle—not the other sort of metal—which will confound the Germans.

Rumour is an interesting phenomenon and if anyone had the time and patience to study and probe the subject a good book could be written about it. The spy story of the Nun with the Hairy Arms emerged from twenty years' hibernation since the last war and enjoyed a butterfly existence—sensational but brief. Another rumour which has had a good public is the one crediting Lord Haw-haw with having stated on the German radio that it was a pity that the Blanktown Town Hall clock had been two minutes slow for the last few days. I have heard this story told with complete conviction, during the past two or three days, of the Town Hall clocks of Colchester, Berkhamsted and Watford. How, one naturally wonders, do such rumours start? Probably in many different ways—misunderstanding, sheer stupidity, misplaced humour, the craving for selfimportance. How far our recent crop of fables have been started, if at all, by enemy agents we cannot tell. Do people—other than enemy agents—deliberately invent the stories that develop into rumours? I doubt whether this often happens. Most rumours probably have some other origin. It is a pity they cannot be traced to their source. I confess that the resuscitation of the Hairy Nun story baffles me, unless it was the work of some joker. Surely an enemy agent would have thought of something new. But perhaps a tried and trusty rumour is the best.

I have always been rather priggishly proud that in 1914 I never believed the great "Russian troops" rumour. Alone in our community, as far as I know, I obstinately doubted, in spite of the convincing details whispered in its support. Much as I longed to believe that large numbers of our Russian allies were being secretly conveyed across Britain to stem the German assault on the Western Front, the sheer unlikelihood of the story was too much for me.

No doubt it is extremes of hope and fear which are the great fertilizers of rumour: what we long for and what we dread take vivid shape in our minds until we can no longer distinguish between fantasy and truth. A clever propaganda like the German can make fruitful play with such a mental state.

It looks as though the Italians will come in at any moment. If so the war must rise to a crescendo of fury. We must hope to give as good as we get in the Mediterranean. For Mussolini it will be a life or death struggle, and he is not in an impregnable position. By next week we shall see what we see.

8th June, 1940

A week of supremely fine weather. On Wednesday, Thursday and Friday not a cloud appeared in the sky from daybreak to sunset. Unfortunately I could not get home to enjoy even the tail-end of these days in the garden. Friday was very hot.

It is sad to think that the glorious weather of the last five weeks must have helped Hitler. The hard ground has been perfect for tanks—and I suppose for bombing.

On Wednesday the Germans began another major offensive against the French lines from the Somme mouth eastwards for 120 miles. So far the French defences have held, though tonight's news tells of tank penetrations for some miles in one area. One feels that the main weight of the attack has not yet developed....

Paris was heavily bombed on Monday and

last night the French bombed Berlin. Generally speaking the main German air effort has been in support of the army offensive.

On the whole it has been a week without big decisions. Possibly we are approaching the climax of this phase of the war—the German drive to the West. So far it has been immensely successful, but not decisive. Air power must ultimately decide this war: it will have to be the striking force for our predominant sea power.

Musso continues to grimace and threaten behind his parapet, but has not so far jumped over the top.... America is speeding up the deliveries of war materials—but these cannot much affect this phase of the war.

9th June

This morning's news is that the Germans have intensified their attacks on the Somme line.... There is no evidence of a break-through, though the French are giving some ground....

The Germans, one notes in the papers, always "fling" their formations, especially their tank divisions, into the battle. The only exception is when they "hurl" them in. "Flinging" is usually, "hurling" invariably, done "regardless of losses." Mr. Hilaire Belloc writes a weekly article in the Sunday Times on the military situation. It is precise, intelligent and—as with all Mr. Belloc's serious writing—impressively authoritative. To me there is something slightly absurd in this application of detached scientific intelligence to the monstrous bedlam chaos raging across Europe—the sheer antithesis of ordered mental process. It is like applying the rules of syntax and the canons of literary criticism to the casual hammerings of an infuriated ape on a typewriter. Better the "flingers" and the "hurlers," I think.

Intellectually I dissociate myself from this war. I did so before it started. I remember a day in August, 1938—the 26th or 28th, whichever of these dates was a Sunday. We were living in an old furnished cottage in a village on the borders of Bucks and Herts and my family was away on a sort of picnic motor tour in Scotland. Reading the Sunday papers I suddenly became clearly convinced that there was going to be another war. Until then I had not felt this to be inevitable. The certain knowledge (for so it came to me) was a shock. Walking alone through the fields that evening, contemplating what must come, I dissociated myself from it. A phrase came into my mind: "I resign from civilization." I saw that the world in which we were living was not the world of reason and sense. That was a private world of individual minds. I decided that privately and individually I would retain my citizenship of that

world—as one might retain membership of a secret aristocratic club in the chaos of some tyrannical revolutionary regime. I reconciled myself to living outwardly in a world and an age of barbarism. This of course did not affect my outward actions or reactions. If anything it intensified my feelings of patriotism. I writhed with shame when Munich came. Once war became inevitable to flinch from it seemed to me a major disaster. . . . It justified the taunts of the Dictators that democracies would not fight. . . . I believe that taunt remained partially true even when the war had started. We wanted victory but shrank from sacrifice. In April and May this year the Germans destroyed that illusion.

It was not that I nursed any feeling of superiority. In as far as this country, by its policy or neglect, contributed to the state of things that made this war possible I of course am just as much to blame as anyone. And my feelings about the war are those of everyone else. War in itself does not shock and horrify me morally, as say dishonesty and disloyalty do. I am as much a barbarian as the rest of us. But in that part of me which constitutes, I hope, a rational and compassionate mortal I reject war as a fantastic barbaric crudity.

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This evening a heavy thunderstorm broke. A lightning flash put the wireless set temporarily out of action. Another, with a violent report, blew a fuse in the electric light. In less than 10 minutes the gravel "drive" in front of the house was flooded. Later it hailed. Thus ends a brilliant spell of summer. Let us hope it has rained torrentially in France and bogged Hitler's tanks.

The rain was needed. The air now is deliciously cool and fresh, laden with perfumes of earth and

flowers.

10th June, 1940

During the 6 o'clock news this evening the announcement came that Italy had declared war on France and Britain.... The odds are now all on the eventual entry of America into the war—but not of course in time to affect the present military phase. We must meet that ourselves.

The mightiest battle in the history of the world is now being fought. It is hard to realize that, in this peaceful place, with the blackbirds piping and the thrushes singing.

11th June, 1940

A rich variety of abuse has today descended on Mussolini's bald pate. I like best Mackenzie King's description of him as "a carrion bird waiting till brave men die." That is a horrible and just indictment. Next best perhaps is Mustapha Kemal's old jeer—"The swollen bullfrog of the Pontine Marshes."

But I can't regard Musso as a coward. A tyrant, yes, and an aggressor; a ruthless assailer of the weak, if you like. But not a coward, after the way he called the sanctions bluff of Britain and France in 1935 when he had no Germany behind him. He faced annihilation then with a pretty bold front. And he faces it now, as he must well know. Perhaps he has chosen what he considers the lesser of two evils.

I feel we should strike a hard and swift blow at Italy. They do not like punishment and they have asked for all they may get.

12th June, 1940

Today—to give the war a rest—I have been looking at houses. Since I was posted in April I have wanted to get nearer to my job, as there is no living accommodation in my present H.Q.

All my life I have been a migrant. Seven years is the longest I've ever lived in one place. I envy people who are stable and rooted: who can identify themselves with one place and cultivate their interests there. I dare say wandering has its advantages, but at the moment I cannot call them to mind.

15th June, 1940

Yesterday Paris fell to the Germans. It was not defended by the French. Fierce fighting continues across France. America is openly assisting the Allies with war material. The Russians are sending more troops into Lithuania. The Italians have not started any serious land offensive.

The abandonment of Paris to the Germans is a melancholy and sombre event: a shadow over history. For the French 1940 must stand as a black year in their memories. But it is not yet over. If they stand against the blow they will

triumph.

Hitler has been talking, in an interview, of what he does and does not intend to do with his victories. His peace and war aims need not interest us. It is pointless to pause even for a moment in this struggle to consider its possible outcome or to ponder this or that eventuality. Our only interest is in fighting the war. If necessary the war must last for ever. We must organize a permanent war economy and a permanent war mind, undeflected by speculative thoughts of the result. We are not fighting to preserve the prewar world: that has been destroyed. We are fighting to win. What follows is in another chapter

and we will deal with that when the pages have been turned. So much for that.

We have, it seems, found a new house at last or rather a bungalow. It is in —— and pleasantly situated with a wood as part of the garden. . . .

Trees I think are essential to a home. Their beauty is peaceful. It is because of the absence of trees that I do not feel at home or at rest in downland country. The wide sweep and the bare contours of the Sussex Downs, for example, do not

make me want to live among them.

Elms and oaks and beeches are the trees I like best—better than pine and firs, which to me seem always slightly alien and outlandish. They are not, like the great full-foliaged trees, a natural feature of the English scene. Similarly, I like best the familiar garden and hedgerow birds, blackbirds and thrushes, robins, chaffinches—how handsome and resplendent the cock birds are in early summer—and that quiet, modest, delicate little creature the hedge sparrow. I am not the sort of bird lover who will lie on his stomach half a day in damp vegetation with a spy-glass to catch a glimpse of some rare crested somethingcock. I like the birds of the fields and woods and gardens; with whom one can feel on friendly terms.

16th June, 1940

A change in the weather this morning. The wind has shifted towards the north and it is colder than it has been for weeks.

The French Cabinet has been meeting. What decision must they take? We need all our national resolution at a time like this. Hitler has not yet felt the temper of this country. Our resources are virtually untouched. Now is the time to show that we are the great people we have declared ourselves to be: the great people that our fathers were.

If I were a leader of this nation I would say this. British men and women, you are fortunate in your generation. Rejoice and be proud that you are alive in the hour when your country needs you most. If it is not a privilege to serve Britain in her time of great peril, then the basis of our spiritual commonwealth is false and the tradition of our upbringing a delusion. We of our generation need not now envy the men of old time who built the spiritual structure that is Britain. We are called upon to defend it from destruction. We have the chance to show the mettle of our pastures.

I am sure that the spiritual resources of our nation are vast and indestructible. Let us gladly hazard all our material greatness to preserve our virtue of soul. Let us safeguard that for our children.

17th June, 1940

The French have admitted defeat. Pétain has asked for terms. That leaves the British Empire against Nazi Europe. We are in for a hard time. What, one wonders, happens to the French navy?

19th June, 1940

Last night some hundred enemy bombers raided the east coast. Seven were brought down—possibly more were destroyed. Twelve civilians, including five children, were killed. Little military damage reported. It was a clear moonlight

night with little or no cloud cover.

The French are still awaiting their "terms." I shall be surprised if Hitler is so venturesome as to make them overwhelmingly harsh. He must know he cannot intimidate Britain and there is scarcely anyone else left to intimidate. And mild terms accepted would give him all the benefits he could derive from harsh terms enforced. Perhaps he will not be able to resist the melodramatic appeal: vengeance for November, 1918.

Was there ever, in so short a time, so dramatic a reversal of fortune? Was France too harsh in the post-war years, or were we too lenient later? Perhaps an unanswerable question. The sure truth is that to combine harshness with indecision and weakness was fatal. Probably it is the truth that Britain is now suffering for her humane in-

stincts and good intentions.

Not that such speculation has any present point. We are in for a hell of a conflict. There is a stimulation in standing alone.

21st June, 1940

The French armistice negotiations, or whatever we should call them, move slowly, and Hitler's terms have not yet been made public. It is incredible that he will make them sensationally severe and so strengthen the "fight to a finish" element in France and the French Empire.

One hears little comment on the remarkable British offer of union between the two nations. Somehow it seemed to lack reality: to be in the nature of a gesture rather than a solid political

proposal...

I have always felt suspicious of the Bonnet-Laval element in France. They were always appeasers at heart, always keeping half an eye open for an "understanding" with Germany. One suspects they had Italian contacts and the entry of Italy into the war strengthened their influence. It needed a Clemenceau to squash the defeatists with his iron will and his indomitable French spirit. . . .

Somehow I feel it is unlikely that Hitler will forthwith begin a direct frontal attack on Britain. It is always his policy to undermine, to strike at

the weakest point, not the strongest.... A protracted bombing campaign against Britain does not seem a very attractive plan, because two can play at that game and in it Germany must suffer terrible losses both in aircraft and in her own industrial areas. With Russia on his borders he cannot wish to weaken his fighting potential. Submarine and air attacks on shipping and harbours seems a likely line—unless that is too slow. There is not only Russia to think of, but America, too. He must finish the war, if he hopes to win it, before the solid wall of American anti-war sentiment, obviously crumbling, tumbles down.... I would not put a "peace offensive" out of the question.

Once more it is a perfect summer evening. How utterly remote, in this quiet countryside, seem the shadow and thunder of war.

What is freedom? What is the substantial shape of this concept to which we cling? Every man's liberty is circumscribed. Below what point does the limitation of freedom become intolerable? I incline to think that freedom—political freedom—consists in being governed by a regime which shares one's own standards of right and wing.

22nd June, 1940

This, if things go according to plan, will be our last week in T—. We moved into this house at the end of September, 1938, in the week of the "Munich crisis"—a "black week" to me. Our time here has indeed been punctuated with crises, and we leave at a moment when we are facing the biggest crisis of all. The next three months may be the most tremendous in our history. There is something stimulating in a fight for life—boats burnt, no mental reservations, nerves steady. The whole nation becomes conscious of that singleness of purpose habitually felt in war-time by the fighting Services, who think only of the military objective. Our "war aim" is now clear to all.

A common saying one hears nowadays is: "We must just live from day to day." That is the soldier's outlook. He does not worry about the future. He extracts the full profit and enjoyment from the hour's respite, the good meal, a night's comfortable billet, without looking at what lies beyond. He lives in the present.

That perhaps is the secret of happiness. Sufficient unto the day are both the evils and the good thereof. One can never be safe against the future, and one of the banes of modern life has been the craving for security, that nervous desire to hedge oneself about against the dangers of tomorrow which occupies so much of the thoughts of civilized men. The labourer who earns a weekly wage and spends it all, who stands, as we think, on the

verge of destitution, has few financial worries. Only when he begins to save, to satisfy not only his immediate wants but all the imagined wants of the future, does he begin to lose his freedom of mind. There is no security in this world; it is not an attainable condition of life on this planet. To strive for it is to strain after the impossible.

When I was a boy, until 1914, we thought of the general advancement of civilization as part of the natural order of things. We see things differently now. God, it seems, is no respecter of civilizations. There are still forces at large in the universe that can destroy our man-made systems. The world is seen for what it has always been—a dangerous place. That is a salutary experience. It should make us understand that we are all of us frontiersmen of a threatened territory.

I remember those pages of Pepys's diary in which, after the British fleet had left its anchorage in the Downs and disappeared into the stormy North Sea to seek decisive action with the formidable Dutch, he sat day after day in his room at the Admiralty waiting for news. It seemed to him that the fate of Britain hung in the balance. He had done all he could. Now he must wait, while all his stout patriotic British heart held dear was at hazard in the fury and chance of battle.

Two hundred and seventy years later we can share his feelings—as, one may fancifully think, he may share ours while from the Shades he watches the fleet he so largely created still at sea against his country's enemies. A continuity of history and tradition is a powerful element of strength in a nation. Strange to think that so much of what we feel and know to be Britain consists only of an image in our minds. So much of life, indeed, is thought—if that is the right word. We are, so to speak, the accumulation of our past experiences, as a tree is the accumulation of its growth.

26th June, 1940

For the last two nights there have been air raid alarms. Bombs, I learn, were dropped some miles beyond Aylesbury last night, but so far none in our neighbourhood. The wailful mourning of the sirens is a dismal sound. I should prefer something more challenging—a clarion-call, not a sound like the dying moan of fatally wounded Martians. (I recollect this, I think, as one of H. G. Wells's early stories.) I used sometimes to think in the last war as I lay in my bunk at sea when mines were floating around, how strange it was, and how difficult to grasp, that at any moment one might be precipitated violently into eternity. Now we can enjoy the same sensation in our comfortable beds in Hertfordshire. Thus the world progresses.

5th July, 1940

Yesterday the French fleet was "seized or sunk." At Oran only was the latter grim alternative necessary. Here the magnificent Dunkerque and Strasbourg lay, with other big ships, and, after the French Admiral had refused all proposals that would have prevented his fleet falling into the hands of Hitler and Mussolini, our Mediterranean squadron opened fire. It was a melancholy, tragic act. The destruction of the ships was nothing: the death of French sailors, lately our comrades, is horrible to think of. Few have been called on to make harder decisions than the men who took responsibility for that act. They will, one may think, never forget it. Such events illustrate—if further illustration were needed—the unnatural ethics of war.

On the plane of such ethics—the plane on which nations today must act or perish—the thing was justified. It followed inevitably from the actions of Pétain's government. More and more they fall below the standards we have known as French.

That Hitler would have used the fleet against us is completely certain. Not perhaps at once, because of the difficulty of finding crews, but sooner or later. No doubt he wanted it safely in his pocket before launching his attack on Britain. It would have been a pleasant little insurance policy against failure. How far has the loss of this fleet, as an effective force, interfered with his plans?

At least, my question of 17th June has been answered.

6th July, 1940

I have been editing a collection of extracts from Raleigh's Vol. I of "War in the Air," which it is proposed to use, I believe, at the I.T.Ws. In the course of it I used the phrase "the mettle of your pastures." This baffled my typist, and after consultation with the rest of the Typing Pool she came to ask whether that was what I really meant to say. I explained that it was a phrase of Shakespeare's, and this prompted me to look up the speech when I got home. What a magnificent sentence.

"And you, good yeomen,
Whose limbs were made in England,
show us here
The mettle of your pasture."

How truly Shakespeare speaks for England, from the past of three centuries, striking the very note of our feelings like a well-tuned bell. He speaks the language of our present thoughts. The mettle of our pastures, the virtues of our soil and clime these are the spiritual armaments we must lift against the bombs and propaganda of the enemy: the essential native valour of the British race, springing from the land we have lived in for a thousand years.

The advantage of Churchill over Chamberlain is that he thinks and feels like the historic Englishman. His rhetoric springs naturally from a youthful imagination. Churchill's mind does not conform to the pattern of a government department: it moves boldly through the centuries of British history, vigorous and kindling. Instinctively he dramatizes the situation. He might conceivably fail: he would never make a decision of which the ordinary Englishman would be instinctively ashamed. Chamberlain might always avoid the wrong path. Churchill will always choose the right direction.

7th July, 1940

July is following the example of its predecessors in giving us lovely Sundays. This morning there is a fresh wind blowing and great white billows of cloud roll across the sky. From a high hill in open country one would see their lightfooted shadows fleeting across the patterned fields. There is something peculiarly light and subtle and evanescent about these shadows of white clouds. They slip over the landscape scarcely seeming to touch it. They are airy and detached and not of this world. They pass on swiftly about their distant business beyond the horizon.

A few yards in front of the window of the room in our new bungalow which the house-agent calls "the lounge" a great oak tree grows. I think one might fairly describe it as a massive oak. It must be twelve to fifteen feet in circumference, and though several of its large boughs have been lopped—I suppose when the bungalow was built it still spreads an imposing mass of foliage. I don't know much about the age of trees, but this fellow must have stood where he now stands for several centuries. Once no doubt he formed part of an untrodden woodland area. This outlying suburban fringe is still well wooded and retains something of its original forest character. Chance has brought this tough old giant to live out his latter days on a lawn. He may well outlive this transitory phase. Round about, a number of little seedling oaks, his offspring, have taken root. Their chance of attaining the stature of their parent are not, I suppose, very rosy. Otherwise one might wonder in what sort of an England they would come to spread the branches of their maturity.

We think of the oak as our national tree. For centuries it provided the timber for our fleets, though I believe that towards the end of the sailing-ship era much of our shipbuilding material was imported from Scandinavia. That was one of the reasons why it was so important for us to retain control of the North Sea during the Napoleonic wars. We look on the oak as a symbol of strength. But there is something more than that. The oak is not an ordinary tree. It has retained from the days of the Druids and the Norse mythology the faint surviving element of religious association. Deep in our minds we pay a measure of respect to the oak tree. These ancient rooted beliefs and venerations die hard and slowly. In England this feeling towards the oak tree has survived more than a thousand years of Christianity. After all, I suppose our forefathers were pagans for longer than they have been Christians.

Of the war, nothing new today. The question seems to be whether Hitler will directly attack these islands or attempt first to get control of the Mediterranean. One can imagine that he would like to see the Italians do some fighting: unless he doubts the result and thinks that their forces are of more value in being than in action. At least I devoutly hope he defers his invasion until after Friday, when we are fetching M—— home from his last term at Prep. School, "after the swimming

sports."

9th July, 1940

It was announced today that the French battleship Richelieu, which lay in the W. African port of Dakar, has been "prevented from falling into enemy hands."

13th July, 1940

The "lull" in the war continues, broken only by air operations. Many German bombers and fighters have been brought down when making mass attacks on convoys in the Channel. The inactivity in the air during the early months of the war, and the relative ineffectiveness of air attacks on warships cloaked the truth that air power must decide the result of this war. So the Germans are bound to attempt a decisive attack —by whatever means—before our air strength is fully developed. By next spring the gap between our potential air strength and our actual first-line forces will have been greatly lessened. The next three months must surely see a terrific struggle.

On Thursday evening I was delighted to find a hedgehog in the garden. I have a liking for these odd little beasts. They do good in a garden, destroying wireworm and other crawling pests. With the exception of the tiny shrew, they are about the only animal not classed as vermin which an ordinary garden can harbour—for the grey squirrel which has driven the English red squirrel from most of its native woods—is no better than

a destructive tree-rat, for all its agreeably agile manners.

Dogs attack hedgehogs with intense excitement, but their prickles are a pretty effective defence. I have heard that foxes are cunning enough to roll them into pools of water: the cold shock causes the victim to relax his muscles and the fox instantly plunges his teeth into the soft flesh of the grey unprotected belly.

They are generally covered with large fleas, but as hedgehogs are not the kind of pet one is much disposed to fondle this doesn't matter. Gipsies are said to eat them—rolling them in a ball of clay and baking them in the embers of their fires. The spikes come away when the clay is removed, leaving a tasty morsel. I hope we are not reduced to baking our friend, a descendant of one of the most ancient of surviving British animals.

 home safely, which removes one anxiety from our minds these anxious days.

14th July, 1940

Last Sunday, after the cloudy-blue morning I described, turned later to rain, with a thunderstorm in the afternoon—this to the delight of gardeners and, I imagine, farmers. As there is no cricket to spoil, no one can object to a little rain.

As presumably our immediate object is to carry the war through the winter keeping our military position intact—at home, on the seas, in the Mediterranean—we can in a sense feel that every day passed is a day gained. But it is fantastic to suppose that the enemy, with his great land and air forces, will allow himself to drift into a disadvantage by the mere accretion of time. He will strike hard and shrewdly. Where?

In the Balkans Russia bars the way. An invasion of the British Isles—the shortest way to victory, if successful—is a hazardous enterprise the results of which, if dramatically unsuccessful, it must be difficult to assess. Such an attack, too, involves elements of chance and hazard which lie outside the field of German military experience. The Mediterranean? Through Spain to Gibraltar, across to N. Africa and a combined German-Italian attack eastward upon Egypt and the Suez Canal? Feasible, perhaps, but not rapid. Perhaps one should expect a full-out blockade and intensive air attack on Britain lasting six weeks or more, to be followed by an invasion in the autumn—mid-September—while the weather may still be expected to hold out for a short concentrated campaign and the nights are longer to cloak a sea crossing.

What ought we to be doing, in addition to strengthening our immediate defences and developing our maximum resources? We should be examining the enemy's position, looking for

his weaknesses. They will be found in his European position. He has to control vast areas of Europe mostly populated by hostile, some by desperate and stubborn people. For the moment Europe seems to lie prostrate, but conditions can change with surprising suddenness. Only by exploiting that situation can we be in the end completely victorious. While we resist and are unsubdued, the Germans are living on a magnetic minefield of their own laying.

The French are a resilient nation, not to be felled at a stroke. In time Hitler will find he has to deal not with the France of 1940, but with the France of a thousand years of indomitable life and growth. I adhere to the belief that things of the spirit cannot be destroyed by sword and bomb.

To quit the war for a moment. If I see an unfamiliar bird, I seek to identify it from a volume called "British Birds," by Saunders, which was my father's—picked up at a sale I expect as I do not remember it in the house when I was a boy. It is a solid leather-bound tome (the right word, I think) of over 700 pages: two pages are allocated to each British bird, with an engraved illustration—a plan which the author in his introduction says "may justly be called 'Procrustean'" (and who am I to gainsay him?). It was published in 1889, and as I estimate that the learned author must have lived at least forty years, probably more, to have acquired all the knowledge it contains, it is safe to assume that he must long since have passed to his well-earned rest and the sessions of the Zoological Society know his enlivening presence no more. This allows me to remark upon his achievement in writing more than 700 pages about birds with scarcely a single escape from pedantic monotony. From the missel-thrush or storm-cock on page 1, "the largest indigenous species of the genus," to Wilson's petrel on page 729 he maintains a remarkably consistent level of dulness. Admittedly the book is a Manual: its object is to inform rather than to entertain. Nevertheless his steady pedestrianism is astonishing. One has to conclude that Mr. Howard Saunders, "F.L.S., F.Z.S., etc.," was a dull dog, a noser-about in museums and mouldy collections of stuffed oddities, a porer over the records of more active men. To him the classification of winged creatures in their correct order, families and sub-families was a matter of supreme importance. Even so, caution and conservatism were uppermost, and he notes with disapproval the suggestion of a critic in Nature that he "ought to have boldly followed up with Picariæ with the Steganopodes, Herodiones and Anseres, instead of the Columbæ!" Such reckless daring was foreign to his nature.

Again, he aims at the most minute accuracy in assessing the range of his various subjects. The crested tit-mouse, he tells us, inhabits the pine forests of Scandinavia and Russia to about 64° N. Lat.; and eastward it can be traced as far as the valleys of the Don and Volga. Even when dealing with so delightful a creature as the buffelheaded duck (p. 441) he refuses to let himself go. He is equally guarded in his comments upon that regular visitor to our estuaries, the bartailed god-wit. Only the most exacting scientific evidence satisfies him. He remarks unfavourably upon the suspicious behaviour of Mr. Walter Rothschild who was reported to have shot a marsh-sandpiper near Tring Reservoirs in October, 1887, but who refused all invitations "to submit this treasure to competent authority."

And yet the book is readable. It is readable because of the abiding and inescapable interest that lurks in a statement of fact. Mr. Saunders had something to say and said it. He tells us, for example, that the sooty shearwater visits the northern coasts of France and has "occurred" more than once in the Faroes, lays a single white egg about 2.6 by 1.7 inches in dimensions; that the male assists in the work of incubation and that the young of a similar bird, which are very fat, are esteemed a delicacy by the Maoris. Such is the pure material of prose: statement without suggestion. So much for Mr. Howard Saunders. F.L.S., F.Z.S., etc. God rest his aged bones somewhere, amid the stuffed ghosts of the Whooper (or Whistling Swan) and, one can hope, the buffel-headed duck.

10.45 p.m. A quiet night. A half-moon is illuminating little wavelets of cloud with an exquisitely delicate pale lemon radiance, and beyond, pools of deepest blue. The thought comes to me that this is no world for such as Hitler.

16th July, 1940

Today I happen to be forty-five. How different was the world into which I was born in 1895. A confident world, secure, optimistic, and believing itself afloat on an ever-prosperous wave. Queen Victoria, now almost a legend, was still very much alive and the motor car, though in process of invention, was unknown on the roads. Jazz music and the crooner still slumbered in the womb of the future.

For the thousands of babies born in Western Europe in that year the weather looked set fair. Instead it was set towards Gallipoli and the Somme, and for some even towards Dunkirk and —who knows what?

We could not know it, but the epoch of progress and security was drawing to its close. What looked like the blaze of morning glory was really

the sunset glow. We were destined for a new age of conflict and catastrophe, of tumbling thrones and mushroom principalities, wars, revolutions, battle, murder and sudden death. And now we are at the very centre of the maelstrom, at the height of the storm, the very point of impact between mighty forces. Salamis, Marathon, Actium, Tours, Senlac, Agincourt, the Armada, Blenheim, Trafalgar, Waterloo, Jutland, Passchendaele—these names resound no louder than the tale of our own days. As someone said to me in the Mess, we may complain that life is savage, uncomfortable, brutal, short, what you will—but we can't say today that it is dull.

One thing is about to be put to the proof. Are we indeed the great race of people we have said

(To be continued)

Rolls-Royce Engines for the World Speed Record

THE unprecedented feature of the world air speed record, which was gained for Great Britain last November by "the magnificent Meteor" aircraft with Rolls-Royce jet engines, is that it was achieved at over 600 miles an hour, with a difference of only 3 m.p.h. between the average speeds of the two aircraft, with only cruising power being taken from the engines and burning paraffin as the fuel.

Rolls-Royce Derwent engines will again be used in the forthcoming attempt, but this time more power will be taken from them. Last time, the engines were cleared for 4,000-lb. thrust, but they were "screwed down" to give a thrust of 3,600 lb. each; this time they will be capable of delivering 4,200 lb., though all this power may

still not be used on the record runs.

THE ENGINES

The jet-propulsion units which will be used are Derwent Series V. They are standard engines, taken from the assembly line in the Rolls-Royce works at Derby and incorporate the latest production modifications—a normal part of the progressive technical development which is continually proceeding in the true Rolls-Royce tradition. They include such features as improved metallurgy in certain parts, as, for example, the turbine blades; otherwise the Derwent V's are normal and similar to the motors now in service in the Gloster Meteors with the R.A.F.

This engine comprises straight-through combustion with single-stage, double-sided compressor and single-stage axial turbine, mounted on a common shaft together with inter-cooling fan and surrounded by nine separate combustion chambers. The double-entry blower gives maximum air flow and higher efficiency and contributes to the enormous powers obtainable from so small and light a unit. The Derwent V measures only 43 inches in diameter and weighs 1,250 lb., the best power-weight ratio of any aero engine in service with the R.A.F. or indeed in the world.

PERFORMANCE

The propulsion efficiency of a jet engine varies with the temperature and pressure of the atmosphere and increases with the speed and altitude. Whereas the standard production Derwent V engines are rated to give a thrust of 3,500 lb. for take-off at 14,600 r.p.m., the engines for the record attempt have given considerably greater powers on the test bed; namely, 4,200 lb. at 15,200 r.p.m.

Most people think in terms of horse power and it may be said that at a speed of 600 m.p.h. the thrust of 4,200 lb. from the Derwent V is equivalent to more than twelve thousand horse power, allowing for the loss in efficiency of an airscrew at this speed. It is only this enormous power available from the pure jet engine that enables these astonishing speeds to be achieved; and it must be remembered that every extra mile an hour over 600 takes a lot of getting.

The acceleration of the Rolls-Royce jet engines from an idling speed of 2,500 r.p.m. to full speed—15,000 r.p.m.—in less than four seconds is another remarkable mechanical performance figure, when the top speed of the impeller is equal to eleven hundred miles an hour—faster than the speed of a rifle bullet.

At 600 m.p.h. the Derwent engine consumes more than two tons of air per minute, part of which is heated at 2,000° centigrade in the combustion chambers and is discharged through the jet pipe at 750° C. It would exhaust the air from the 12-foot-square living-room of an ordinary house in one and a half seconds.

The Rolls-Royce contribution to the supremacy of the R.A.F. in the air is unique. For nearly twenty years, since 1929, they have used Rolls-Royce engines to gain the world speed record for Great Britain; and any increase on the existing speed of 606 miles per hour by the Gloster Meteor will be a truly magnificent achievement.

Rolls-Royce Mobile Instructional Unit on Jet Propulsion

Though instruction on gas turbines has been proceeding in the Rolls-Royce Instructional School at Derby for some time, the urgent requirements of R.A.F. Fighter Command for the preliminary training of all engineer officers and fitters on Rolls-Royce jet-propulsion engines necessitated increased facilities. Owing to the shortage of skilled fitters in the R.A.F., men could not be spared for the existing fortnightly courses at Derby in sufficient numbers.

To meet the emergency, Rolls-Royce designed and equipped a mobile instruction unit to tour R.A.F.

Fighter Command and other stations.

A ten-ton van was supplied by Technical Training Command, and in the short space of three weeks Rolls-Royce completed the fittings and equipment of the interior and sent the unit on tour with a "Rolls-Royce Instructor" to Fighter Command Headquarters, where

the engineers went through the first course, which covers approximately eighteen hours' instruction.

The equipment includes a complete sectioned Rolls-Royce Derwent jet-propulsion engine, and twelve trainees can be comfortably accommodated at folding desks inside the van. All instructional aids, such a blackboards, working diagrams, lantern and cine projectors, are neatly fitted in the interior, together with certain parts for demonstration purposes.

Meanwhile, the Rolls-Royce Instruction School in Derby still continues to run at full capacity on courses in "jet propulsion"—the twentieth course having recently been completed. Each course consists of sixteen trainees for a period of fourteen days, and many Service officers and men have come from the Dominions as well as from the R.A.F. in Great Britain.

Book Reviews

HERALDRY IN WAR. FORMATION BADGES, 1939-1945. By Lieut.-Colonel Howard N. Cole, O.B.E. 143 pp. (Gale & Polden Ltd.; 12s. 6d.)

A very interesting collection of Army badges, fully illustrated and with a brief account of each, which will be of interest mainly to Army and ex-Army personnel, or any keen on heraldry and unit badges.

THE A.B.C. AIR GUIDE. (2s. 6d. monthly.)

The Guide is divided into three sections. Firstly, an alphabetical world gazetteer informing the user how to reach each place from the United Kingdom (with times, fares and baggage details when possible). Secondly, numbered time tables, giving times, fares and baggage charges of the main airways and branch services. Lastly, a section devoted to useful information to the air traveller. These are backed up by three coloured maps—of the United Kingdom, Europe and the world—showing air lines.

Basic Mathematics for Radio Students. By F. M. Colebrook, B.Sc., D.I.C., A.C.G.J. 270 pp. (lliffe & Sons Ltd.; 10s. 6d.)

The first six of the seven chapters into which the book is divided are quite general, and it is only in the final chapter that mathematics are applied to radio problems and even these are largely of a general character that will interest students of any branch of engineering or physics. The author has tried at each stage to link up basic mathematical ideas with the real world of sensory experience. Although written primarily for radio engineers, the book is suited to students—and even to some teachers—of other subjects.

GAS TURBINES AND JET PROPULSION FOR AIRCRAFT. By G. Geoffrey Smith, M.B.E., Editorial Director of Flight and Aircraft Production. Foreword by Sir Geoffrey de Havilland, C.B.E., F.R.Ae.S. Fourth Edition. Size 5½ in. by 8½ in. (demy 8vo). 246 pp. Over 200 illustrations (Published for Flight by Flight Publishing Co. Ltd.; 12s. 6d. net.)

Recent official pronouncements have stated categorically that the R.A.F. is interested only in jet-propelled fighters for the future, and that projected commercial aircraft are being modified and redeveloped for turbine power units of either jet or airscrew types.

The publication of this fourth edition of "Gas Turbines and Jet Propulsion for Aircraft" is therefore timely, and will meet a definite need for concise and comprehensive information on this epoch-making change in propulsion technique.

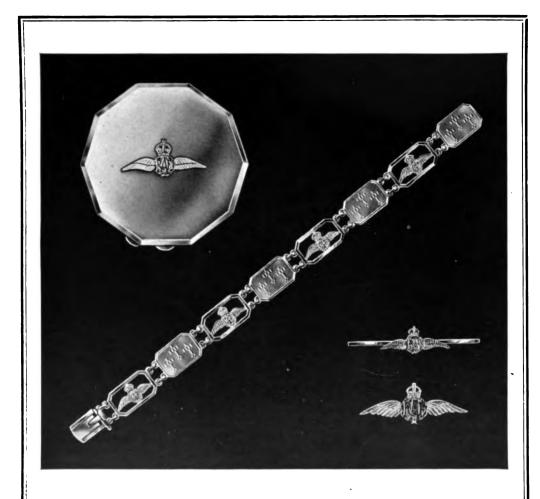
First issued in 1942, and also published in the United States, this work has been widely adopted as the standard textbook on the subject by universities, technical institutions, and government and commercial training establishments.

The twenty-one chapters of this edition deal with fundamental principles, construction, operation, and testing and maintenance of power units. Descriptions of existing British, American and German units and aircraft are supplemented with details of projected future types.

The respective merits of jet and airscrew propulsion, and of tailless and all-wing aircraft, are discussed: and the aerodynamic problems of compressibility effects and boundary layer control are investigated.

Extending to 246 pages, the book is illustrated with more than 200 photographs, drawings, diagrams and curves. Chapter contents include: Jet Propulsion—Thrust and Performance—Early Projects—Gas Turbine Components—Combustion Systems—Metallurgy—British Gas Turbines—American Gas Turbines—German Gas Turbines—Testing and Maintenance—Current Types of Turbine Propelled Aircraft—Jets versus Airscrews—Turbines—Airscrew Projects—Aerodynamic Problems—Tailless Aircraft and the Flying Wing—Closed-Cycle Gas Turbines—Steam Turbines—Guided Missiles and Flying Bombs—Official Adoption of Jet Aircraft—Broadcasting the News—Notable Views on Turbine Propulsion.

Printed and Published in Great Britain by GALE & POLDEN Ltd., Wellington Press. Aldershot. Overseas Agents, INDIA: THACKER, SPINK & CO., Calcutta and Simila. THACKER & CO., Ltd., Bombay. HIGGINBOTHAMS. Ltd., Madras and Bangalore. CANADA: WM. DAWSON SUBSCRIPTION SERVICE, Ltd., 70, King Street East, Toronto, 2 Canada. AUSTRALIA and NEW ZEALAND: ANGUS & ROBERTSON, Ltd., SOUTH AFRICA: W. DAWSON AND SON (S.A.) Ltd., 29 and 31, Long Street, Capetown.





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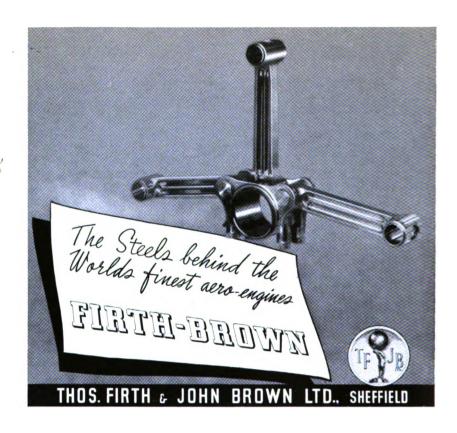


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